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ABSTRACT

This collection of symposium papers is published for members of the American Alliance for Health, Physical Education, and Recreation with the intention of providing current synthesis of research in physical education. This volume contains papers discussing and analyzing research on teacher behaviors in the field of athletics and movement education and their correlation with pupil achievement. Also included are papers on play environments for children. Two articles examine professional football and cycling from an historical perspective. (JD)

AAHPER Research Consortium

SYMPOSIUM PAPERS:

TEACHING BEHAVIOR AND SPORT HISTORY

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VOLUME I BOOK 1

1978

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A NOTE TO THE READER

The Symposium Papers (Volume I, Books 1, 2, and 3) are published with one major purpose in mind. The papers are intended to provide the reader with an up-to-date synthesis of research in a wide variety of areas. Presentations were invited from each of the seven associations of AAHPER. Review boards screened Symposium Presentations under the direction of the Research Consortium President-elect. Special attention was given to the quality of the presentations and to the relevance of the research syntheses to the practioners in each of the seven associations.

The Symposium Papers are being made available for sale, for the first time, at the convention at which the actual papers are presented. This is done to make these research syntheses available to Alliance members at the earliest possible time, while the information is current and useful. To do this, it was necessary to make each author responsible for preparing his or her own manuscript. To be eligible for publication authors were required to submit their intent to publish early in the year and submit a manuscript, typed in the proper format, by March 1, 1978. In cases where authors failed to meet the above listed guidelines, the papers were deleted from this publication.

These Symposium Papers are photographed from original manuscripts submitted by each author. The screening of symposia served as the editing process, once accepted sole responsibility for the content rests with the author(s).

Because the Symposium Papers presented at the 1977 convention were not published, authors of these papers were invited to submit them for publication in this 1978 volume. Accordingly, Volume I includes some papers from 1977 as well as those from 1978.

It is hoped that these Symposium Papers are useful to members of all associations of AAHPER.

Charles B. Corbin
Editor

Christine L. Wells
President-elect
Research Consortium

Note: Because of the length limitation imposed on authors, reference lists are necessarily short. In most cases, more complete reference lists are available from authors on request.

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Applied Behavior Analysis Research in Teacher Education

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Teacher education programs have been the center of controversy for many years. Much has been said relative to various perceived inadequacies existing in these environments. Problems have centered upon procedures for choosing specific desirable teaching behaviors and strategies for systematically developing these behaviors in pre-service teachers. There is little agreement upon which teaching skills have which effect upon which students. However, it seems reasonable to suggest that an important goal of teacher education programs should be to develop, maintain, and change teacher behaviors that facilitate student learning.

The applied behavior analysis model or the more familiar term, behavior modification, seems to be a viable procedure for systematically improving the teaching-learning process. This model is the culmination of a line of research begun by B. F. Skinner and has been successfully applied to home, industrial, and school environments. It offers teacher educators a research strategy for studying teaching behaviors as dependent variables and for developing techniques or independent variables that will be effective in changing the aforementioned teaching behaviors. The emphasis is on objective definition, development, and maintenance of human behavior in everyday environmental situations. Basic principles include: development of a precise description of the behavior under consideration, analysis of the specific relationship between the behavior and its consequences, continuous monitoring of the behavior in order to establish a baseline, and an analysis of an introduced intervention strategy. Teacher educators in physical education have observed the effects of several intervention strategies on both teacher and pupil behavior.

Teaching Behaviors

Teaching behaviors have been classified primarily into two categories: input skills and feedback skills. Input skills serve as a discriminative stimulus that signal or cue a specific student behavior directly related to learning. Examples would include: a teacher's explanation of how to perform a tennis serve, a demonstration of a volleyball forearm pass, asking students a question about their understanding of subject matter, answering a student's question, verbally guiding a student through a golf swing, physically manipulating a child's legs in swimming, and physically restricting a student's shooting technique in archery (Rushall, and Siedentop, 1972). Another input teaching behavior that serves a discriminative stimulus function indirectly related to learning is called managerial behavior. Examples would include teacher directions for starting, stopping or changing activities, for picking up or putting away equipment, and for establishing and maintaining order in the class.

Teacher feedback behavior includes all teacher reactions to various student behaviors. These reactions must occur after students have emitted a behavior. The following definitions and categories have been utilized:

1) General positive reactions to on-task pupil behavior - this includes all non-specific positive verbal teacher reactions to pupil behavior other than movement skill attempts. Examples would include telling the class that they were good today or telling a student that he was doing well.

2) Specific positive reactions to on-task behavior - This includes all positive verbal teacher reactions to pupil behavior other than movement skill-attempts that convey precise information about the behavior. Examples would include praising a class for listening to directions or telling squad five that they have a straight line.

3) Positive general feedback for movement skill attempts - This refers to non-specific positive reactions to a pupil's movement skill attempts. These reactions could be verbal or non-verbal. Examples would include, "Nice job, Mike" and "Way to go, girls."

4) Positive specific feedback for movement skill attempts - This refers to all precise positive teacher reactions to a pupil's movement skill attempt. Examples would include praising pupils for keeping their arms straight for a volleyball bump or praising a pupil for getting good height on a shot put throw.

5) Negative reactions to off-task behavior - This includes all no non-specific or specific verbal or non-verbal teacher reactions to off-task behavior. Examples would include telling students stay in line or to stop talking and fooling around.

6) Negative or corrective general feedback for movement skill attempts - This includes all non-specific negative or corrective teacher reactions to a pupil's skill attempt. These reactions could be verbal or non-verbal. Examples would include, "No, that is wrong" or a teacher frowning at a pupil's skill attempt.

7) Negative or corrective specific feedback for movement skill attempts - This includes all precise negative or corrective teacher reactions to a pupil's skill attempt. Examples would include telling a pupil that he did not keep his arms straight for a bump or to keep the left arm straight during a golf swing.

The focus of these teacher reactions has been on different types of student behavior such as managerial behavior, movement skill attempts, unproductive behaviors, appropriate behaviors, and off-task behaviors.

Student Behaviors

Student behaviors that have been observed usually fall under the following categories:

1) Active/Inactive Learning - This focuses on whether the students are physically involved in the class activity.

2) Appropriate/Inappropriate - This focuses on whether students are performing the activities specified by the teacher.

3) Managerial time - This focuses on the time the students spend getting organized for an activity, changing activities, or terminating an activity.

Interventions

The intervention strategies have been packaged in a variety of ways and used with several change agents including: university supervisors, cooperating teachers, peer assessment, and self assessment via audio tapes. Several interventions have served a discriminative stimulus function including:

1) Information sheets - which provide student teachers with information on the value of the teaching behaviors that are to be practiced in future lessons.

2) Written modules - which are packages of information focused upon various teaching behaviors and usually include general goals, special terminal behavioral goals, definitions, learning activities, resources, and assessment procedures for the module. Several intervention strategies have included six different modules within the package.

3) Verbal instructions and cues - which provide student teachers with information and reminders about the various teaching behaviors that are to be practiced.

4) Modeling - which presents a demonstration by a university supervisor or a cooperating teacher of how, when, and where to emit a specific teaching behavior.

5) Verbal mediation - which is a technique where student teachers rehearse the teaching behaviors to be used prior to class time. Rehearsal can be done silently or out loud.

Intervention strategies have also served as a reinforcing or feedback function when occurring after the completion of a teaching lesson. Examples include the following:

1) Verbal and graphic feedback - which involves a visual presentation of collected data and a discussion of the increases, decreases, or stability of the specific behaviors. Information is provided relative to the attainment of specific objectives or goals and the instances in the lesson where behaviors were emitted.

2) Verbal reinforcement - which focuses verbal praise on specific accomplishments of the student teachers.

3) Contingency management - which points out the specific relationship between the teaching behavior to be emitted and the consequence of receiving a passing grade in student teaching as a reward for emitting specified rates of teacher behavior.

Effects of Specific Intervention Packages

Hughley (1973) used directed information feedback with specific cues for application of teaching strategies and found that this would increase the positive interactions and reduce the negative interactions of student teachers. Riffe (1973) found that modeling and feedback were effective in changing the following teacher behaviors: negative feedback for skill attempts, negative reactions to off-task behavior, positive feedback for skill attempts and positive reactions to on-task behavior.

Boehm (1974), Darst (1974), and Hamilton (1974), completed studies that looked at the effects of an individualized competency-based intervention package on nine categories of teacher behavior and three categories of pupil behavior with student teachers at the elementary junior high and senior high school levels. The inter-

vention consisted of instructions, graphic feedback, cuing, reinforcement, and weekly goals for behaviors in the areas of planning, interpersonal relationships, management, instructional feedback, and pupil assessment. Findings revealed that the intervention had a large effect on teacher behavior and a small effect on pupil behavior. Teaching behaviors included: general and specific positive reactions to on-task pupil behavior, general and specific instructional feedback, negative reactions to off-task pupil behavior, group interactions, and use of pupil's first names. Pupil behavior included; appropriate/inappropriate behavior, active/inactive behavior, and management behavior.

Beisecker (1975) studied the effects of a self-assessment technique via tape recorded lessons on the verbal interaction behavior of student teachers in physical education. He concluded that the intervention had a positive effect in changing sixteen categories of teacher and pupil behavior. The following are several of the behavior categories that were included: variety of positive instructional feedback statements, instructional feedback with specific information, use of pupil's first names, length of managerial episodes, and reactions to on-task behavior with specific information.

Dodds (1975) used a competency-based supervision model with peer assessment to successfully modify several categories of student teacher behavior in elementary physical education classes. She concluded that student teachers can significantly contribute to their own supervision under contingency management procedures. Conclusions pointed out that an intensive training program was necessary to attain high reliability levels and the data based approach was a workable model for changing student teacher behavior.

Metzler (1976) used an information reading sheet combined with graphic feedback, instructions, and goal setting to successfully modify four categories of student teacher behavior in a physical education environment. The student teachers successfully completed 78% of the behavior goals set by the experimenter.

Conclusions and Recommendations

The majority of these studies seem to indicate that a variety of intervention strategies are available for developing, maintaining, and changing teacher behavior. These studies point out that almost all behavior categories showed changes in the desired direction. Pupil behavior seems to be maintained or changed slightly in the desired direction. Continued efforts are necessary to determine the relationship between teacher behavior and pupil behavior. Different intervention combinations with a variety of change agents are necessary to improve and refine the procedures for teacher educators. Additional efforts are necessary to explore maintenance techniques after student teachers begin their own teaching positions. Teacher education programs also need to experiment with intervention techniques that in-service teachers are able to utilize without intensive training.

It appears that the applied behavior analysis model has and can continue to make a significant contribution to the body of know-

ledge surrounding the teaching of physical education and the training of future teachers.

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Teaching as Behavior Modification

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The term behavior modification has become a part of our vocabulary during the last 10 to 15 years and probably has been in education and physical education for even fewer years. It carries with it a number of misconceptions and always seems to be a controversial subject. Terminology surrounding the topic such as behavior shaping, contingency management, and applied behavior analysis are sometimes confusing. Our hope is to clarify several misconceptions about the area and show application to teaching-learning environments in physical education.

Behavior modification represents the culmination of a branch of research developed in B. F. Skinner's laboratory approximately thirty-five years ago. His work focused on using operant psychology principles with rats and pigeons. These principles have been tested and refined so that applications are generally accepted as valid procedures for developing, maintaining, and changing human behavior. An attempt is made to shape an environment so that the consequences of a particular behavior will increase or decrease the probability of the behavior reoccurring. The consequences are called reinforcers.

Basic Principles

The basic principles of the behavior modification model have been applied to a variety of environments including: mental hospitals, drug clinics, juvenile homes, industrial settings, home environments, and all levels of education. These procedures are quite effective for increasing desirable student behaviors such as following directions, working on specific tasks, cooperating with other students, and listening to teachers. In addition these techniques can be used to effectively reduce and eliminate undesirable student behaviors such as talking out of turn, fighting, wasting time, and inattention to a teacher's lecture. The basic principles included the following:

1) Specifically define the behaviors in observable, measurable terms;
2) Continuously monitor the behavior in order to establish a baseline rate of occurrance;
3) Determine an appropriate reinforcer that will be effective in that environment;
4) Determine the relationship between the behavior and the consequence of the behavior;
5) Apply this relationship in the environment;
6) Analyze any change in behavior that may occur.

Techniques for Increasing or Decreasing a Behavior

Teachers have always used the techniques or behavior modification in an unsystematic or unscientific manner. It is our contention that teachers need to realize the implications of specific teaching behaviors and attempt to systematically use them in their classes. The following are some specific procedures for increasing or decreasing a behavior:

1) Positively reinforce the behavior with verbal praise, approval, or specific privileges such as free time, dodge ball or basketball;
2) Positively reinforce a student for not emitting a behavior such as cursing, fighting, or arguing;
3) Present a punishment for inappropriate behavior such as expressing disapproval or removing a privilege;

4) Ignore an inappropriate behavior that is not disruptive to the class;

5) Present a model of the desired behavior and positively reinforce the specific behavior.

Teachers need to become scientists while systematically observing their own behaviors as well as the behaviors of their students. Data must be collected so that teacher biases are reduced and changes in behavior can be analyzed. Numberous objective recording techniques are now available for use in physical education environments and will be discussed later in this symposium.

Behavior Shaping

Behavior shaping is a form of behavior modification that consists of reinforcing closer and closer approximations to a final desirable behavior. It focuses upon behaviors that a student does not currently possess. Attempts are made to develop the student's behavior slowly by making the requirements for reinforcement stricter as the student gets closer to the terminal goal. Rushall and Siedentop (1972) point out the following steps in the shaping process.

1. A final performance goal is defined. This is referred to as the terminal behavior.
2. An initial behavior of the student is found that is as close as possible to the terminal performance desired.
3. A set of steps is developed to move from the initial to the terminal behavior. Each step should have a criterion which defines when the step is completed and the student can then move on to the next step in the sequence.
4. A significant feedback/reinforcement signal is found so that each response of the performer can receive immediate feedback/reinforcement.
5. Each step should then be primed. A prime is simply a signal that gives the student an idea about how to perform the particular step. This can be done by demonstration, explanation, or even manual manipulation.
6. Each step is reinforced until the criterion for the step is met.
7. The sequence of steps is followed until the terminal performance is achieved.

Teachers of physical education can use the shaping process by developing a series of behavioral objectives that lead to a terminal physical skill performance. An example would be a series of objectives for the overhand clear shot in badminton. Students could receive reinforcement for clearing a rope that is placed twelve feet above midcourt. Shots would have to clear the rope and get successively closer to the baseline in order to receive reinforcement.

Contingency Management

The term contingency management is often referred to as behavorial engineering. A contingency management system focuses on managing the motivation of students. A contingency refers to the relationship between a behavior exhibited in an environment and a consequence of the behavior. Some have called it "grandma's rule".

The term contingency management, therefore, refers to how you specify behaviors and how you manage consequences to assure that the desired behaviors occur in the environment.

Some of the problems that exist in the education environment are due to deficiencies in the management of the available contingencies. Two of these deficiencies are:

1) That management has been unsystematic both in the definition and specification of behavior and in the application of contingencies;
2) That contingencies have been for the most part primarily negative.

The use of negative contingencies produces side effects which not only retard the educational process but are also potentially harmful to the student.

Basic Types

The development of the contingency management model evolved from David Premack's (1963, 1964) use of high probability behaviors to reinforce low probability behaviors. Singer (1976) has established three basic types of contingency management systems.

1) Task-Reward System - This is the least sophisticated technique and it involves alternate periods of work and reinforcement.
2) Token System - This technique involves the distribution of tokens or chips for instances of appropriate behavior or completion of specified tasks. The tokens can be saved and exchanged for other reinforcers with more value.
3) Contract System - This technique involves a written formal agreement between the teacher and the student(s) on exactly that reinforcer will be made available and how they may be obtained. This system is the most sophisticated form of contingency management.

Basic Guidelines

Rushall and Siedentop (1972) have suggested a series of guidelines for implementing a contingency management system in the physical education environment.

1) Student behaviors desired must be defined in observable and measureable terms.
2) The desired terminal or final behavior must be clearly specified.
3) Reinforce only those behaviors that are specified as terminal or final.
4) The contingency must be clearly stated so that every student knows what is expected of them.
5) The contingency should have learning steps that are fair and can be obtained with a reasonable amount of effort.
6) The performances should be arranged in a progression so that students can experience success early in the environment and then proceed to more difficult tasks.

The contingency management systems can be developed and utilized in any type of physical education environment, i.e., elementary, junior and senior high activity classes, college activity

classes, and academic or theory classes. The teacher only has to identify the desirable student behaviors, the effective reinforcers, and then arrange the environment so that students will work toward the achievement of the reinforcers. Motivation should be built into the system because students know ahead of time what behaviors are necessary to earn the desirable reward. The teacher must strive to make the system a positive or "fun" approach to teaching and learning.

Example of a Contingency Management System

Course: Racquetball I

Text: Racquetball by Randy Stafford

I. Core Requirements

A. Drive Serve: Stand anywhere in the legal service area and make 3 out of 4 legal serves that land within 3' of the side wall. (1 point)

B. Lob Serve: Stand anywhere in the legal service area and make 3 out of 4 legal serves that land with 3' of the side wall and that don't rebound off the back wall more than 6'. (1 point)

Forehand

C. Drive off of the Back Wall: Standing 6' from the back wall, toss the ball against the back wall and hit 3 out of 4 forehand drives that hit below a line marked four feet from the floor on the front wall. (1 point)

D. Forehand Drive of the Side Wall: Stand in the center of the court 6' from the back wall, toss the ball against the side wall and hit 3 out of 4 forehand drives that hit below a line marked four feet from the floor on the front wall. (1 point)

E. Forehand Passing Shot: Stand in the center of the court 6' from the back wall, toss the ball to the side or back wall and hit 3 out of 4 passing shots that land within 3' of the opposite side wall. (1 point)

F. Game Participation: Play in 6 games of singles, cut-throat, or doubles. (1 point)

G. Take a Rules and Strategy Test:
1. 70% - 75% - 80% (1 point)
2. 81% - 90% (2 points)
3. 91% - 100% (3 points)

H. Attendance:
1. 75% + (1 point)
2. 85% + (2 points)
3. 95% + (3 points)

Optional Requirements

A. "2" Serve: Stand anywhere in the legal service area and make 3 out of 4 legal serves that hit in the following sequence. (front wall, side wall, floor and opposite side wall) (1 point)

B. Backhand Drive off of the Back Wall: Same as C in the core requirements. (1 point)

C. Backhand Drive off of the Side Wall: Same as D in the core requirements. (1 point)

D. "2" Ball Forehand Return: Stand in the center of the court 6' from the back wall, a classmate or the instructor will throw by hand a "2" ball. Using a forehand drive hit

3 out of 4 below a line marked 6' from the floor on the front wall. (2 points)

E. 2nd Ball Backhand Return: Same as D in the optional requirements. (2 points)

F. Three-Wall Drive: Stand in the center of the court at the short line bounce the ball and hit 3 out of 4 shots that hit with the following sequence: (front, side, opposite side and floor) (2 points)

G. Kill Shot: Stand in the center of the court 6' from the back wall, tossing the ball off of the back or side wall hit 3 out of 4 shots that hit below a line marked 1 foot from the floor on the front wall. (3 points)

H. Participation: Play singles, doubles, or cut-throat. 1 point/3 games. Maximum points 5

Grading Scale: C 10 points
B 19 points
A 28 points

The instructor reserves the right to lower these point totals if necessary, but I will not raise these totals for any reason.

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Analyzing Instructional Variables in Physical Education with Single Case Experimental Designs

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Behavior modification has become a viable instructional alternative in physical education. With its emphasis on systematic observation, assessment and specification of entry and terminal behaviors, precision teaching including task analysis and shaping procedures, reinforcement techniques, and individualized instruction (Auxter, Note 1), behavior modification is an extremely proficient technology that facilitates the systematic application of learning theory. Likewise, the development of behavior modification as an acknowledged form of empirical inquiry, commonly known as applied behavioral analysis, has provided researchers in physical education with a methodology for studying questions considered generic to the instructional effort.

Single Case Designs

The major purpose of any single case experimental design is to demonstrate control relative to the experimental condition (Hersen & Barlow, 1976). Since the N=1 designs are not encumbered by an exigency to achieve a pre-established statistical level of significance, their proponents seek "clinical" significance. Clinical significance pertains to the effect of the experimental condition on an individual's performance. It is the researcher's honest appraisal of the functional relationship between the experimental condition and its effect on performance that determines significance.

Another major issue concerning N=1 research has to do with generalization of findings. Realizing that generalization from a single case study to other subjects, settings, and/or instructors would be, at best, tenuous, the applied behavior analyst will systematically replicate using different subjects, settings, and/or instructors in order to discover the extent to which the identified functional relationship can be duplicated.

This paper will examine two single case designs, the reversal and multi-element. Each design will be analyzed according to its mode of operation, including major advantages and disadvantages. Additionally, studies that have utilized these designs in an effort to study the teaching-learning process in physical education will be reviewed.

Reversal Design (ABAB)

It is possible to demonstrate a functional relationship between a target behavior and a specific program or intervention strategy by alternating the presentation and removal of the in-

dependent variable over time (Kazdin, 1975). Initially, a baseline phase (A) is instituted for several days during which time a base rate is established for the target behavior. When it is stable or, at least, showing no appreciable signs of changing in the desired direction, the experimental phase (B) is begun. It is this demonstrated stability during baseline that serves as the basis for evaluating change in the target behavior subsequent to the initiation of the experimental phase of the study.

In phase (B), the experimental condition is introduced and maintained until the target behavior diverts sufficiently from baseline and again stabilizes. Although the behavior changes, the design, at this point, prohibits making any definitive statements about the functional relationship between the experimental condition and the target behavior.

A return to baseline (A) or its approximation is the intent of the second baseline phase (A_2). The removal of the experimental condition and the return to baseline purports to demonstrate the functional relationship between the experimental condition and the target behavior.

The final phase (B_1) is a reinstatement of the experimental condition. The target behavior should return to, if not surpass, the level it attained in the first experimental phase. This phase provides additional evidence for concluding that the experimental condition caused the change in the target behavior.

Although the reversal design allows for a clear demonstration of the functional relationship between the experimental condition and the target behavior, there are a number of circumstances which militate against its use. The following are disadvantages of the reversal design: (1) an inability to return to baseline thereby prohibiting definitive statements regarding the experimental condition's effect on the target behavior, (2) the inability to rule out "other" factors, such as increased teacher attention, during the experimental phase, (3) the prohibition against targeting "learned" behaviors because of their irreversibility, (4) the inability to reverse behaviors that are maintained by naturally occurring environmental events, and (5) the impracticality of reversing certain behaviors, e.g., self-injurious behavior (Kazdin, 1975).

Several studies have utilized the reversal design to investigate the teaching-learning process in physical education and related settings. Four of these studies will be reviewed briefly.

Using three mildly retarded and two moderately retarded subjects, ages nine to thirteen years of age, Pierce (1972) compared the effects of four instructional treatments on motor performance with the reversal design. The motor tasks which served as dependent measures were crawling, stair climbing, knee-ups, parallel bar walking, sit-ups, ladder walking, peg placement, and knee standing. The treatments consisted of: (1) prior instruction only; (2) instruction plus social reinforcement; (3) instruction, social reinforcement, and material reinforcement; and (4) instruction, social reinforcement, and goal setting. Results showed that the

instruction, social reinforcement, and material reinforcement condition was the most effective treatment across different motor tasks and subjects.

Horner (1971) attempted to establish the use of crutches by a mentally retarded spina bifida child through the use of a ten-step successive approximation sequence. Baseline data revealed that the subject had crawling behavior and that root beer was a reinforcer. Initially, a six-step successive approximation sequence was used to develop walking with the support of parallel bars. By means of a reversal design, it was determined that reinforcement was responsible for the acquisition of successful parallel bar walking. A ten-step shaping procedure was used to facilitate crutch walking. Although successful in terms of the terminal behavior, definitive statements about the reinforcer effectiveness were not forthcoming due to the confounding effects of not instituting a reversal procedure on the second phase of the study.

Siedentop and Hutchinson (Note 2) studied the feasibility of using a token economy program in an adapted physical education setting for multiply handicapped children. Four members of a class for trainable mentally retarded children with auditory impairments served as subjects. A reversal design was used during which tokens were administered contingent upon performance as it related to a dichotomous behavioral classification, i.e., appropriate or inappropriate behaviors emitted during the routine physical education class. Analysis of the data revealed that the token economy system was effective in increasing the percentage of appropriate behaviors emitted in the physical education class.

Huber (1973) investigated the effects of a token economy program for controlling appropriate behavior and facilitating motor task performance of educable mentally retarded subjects in an adapted physical education class. Eleven subjects between the ages of seven and eleven years were awarded tokens for evidence of either appropriate behavior and/or the number of motor tasks completed. A reversal design was employed consisting of six phases: (1) baseline, (2) intervention on behavior only, (3) baseline two, (4) intervention on tasks completed, (5) intervention on behavior and tasks, and (6) intervention on behavior and tasks. In general, the results of Huber's study suggests that a token economy can increase appropriate behavior and motor task completion above initial baseline level. Additionally, appropriate behavior beyond baseline two level was also significantly increased; however, motor task completion beyond baseline two level was not significant. This could be at least partially attributable to the weakness of the reinforcement contingencies.

Multi-Element Design

The multi-element design provides the means for performing complex behavioral analyses, i.e., analyzation of the effects of two or more interrelated variables. Unlike the reversal design, this design alternates the presentation of the independent variable regardless of changes in the target behavior (Ulman & Sulzar-Azaroff, 1975).

Among its advantages, the multi-element design counts the following: nonreversibility, early termination, unstable baseline, and analyzation of complex behavior (Ulman & Sulzar-Azaroff, 1975). Nonreversibility suggests that the practice of withdrawing the experimental condition, characteristic of the reversal design, is unnecessary.

Another advantage of the multi-element design is the prerogative of the experimenter to terminate the study when he judges that control has been reasonably (not to mention reliably) demonstrated. This is not the case with the reversal design which requires that each phase of the study be conducted until behavior becomes stable over time.

Unstable baselines, a formidable problem in behavior modification research, are not a concern when using the multi-element design. This design incorporates a baseline with the experimental condition. This serves as the baseline against which to compare the effectiveness of the experimental condition, e.g., a non-reinforcement condition compared to individual and group contingency conditions (Ulman & Sulzar-Azaroff, 1975).

The multi-element design facilitates the analyzation of complex behavior. It does this by manipulating the experimental condition repeatedly and varying the order of their presentation. This methodology provides sufficient control to deal with two problems associated with complex behavior analysis: sequence and contrast effects (Ulman & Sulzar-Azaroff, 1975). Sequence effects or the interaction between the experimental conditions are minimized by presenting each condition only briefly (no more than two consecutive sessions) and by counterbalancing their order of presentation. Contrast effects or the interaction within and/or among the sessions are reduced by programming only one condition per session and by counterbalancing. The extent to which these strategies are successful in reducing the problems associated with contrast and sequence effects will remain to be evaluated subsequent to this design being utilized more extensively in the field.

The multi-element design has been used sparingly to investigate the teaching-learning process in physical education. One study will be reviewed here briefly.

In an effort to determine the effects of varying types of reinforcement on learning and retention, Schack (1976) had five trainable mentally retarded males, ages fourteen to seventeen years, perform two gross motor skills, bean bag throw and ring toss. A multi-element design was employed to analyze the effects of four instructional treatments across two skills and five subjects. Treatments consisted of: (1) instruction only, (2) instruction plus potential social reinforcement, (3) instruction plus potential token reinforcement, and (4) instruction plus potential social and token reinforcement. Regardless of the type of reinforcement, it was dispensed on an intermittant schedule; however, it approximated a continuous schedule. A total of forty-eight treatment sessions were presented during the study; twenty-four sessions were conducted for each skill (two sessions per skill day). Analysis revealed that social plus token reinforcement was

the most effective treatment. The remaining treatments in their order of effectiveness included; social reinforcement, token reinforcement, and instruction only.

Conclusion

Based on the research reviewed in this paper, behavior modification is supported not only as an alternative instructional methodology but also as a viable research tool. Applied behavior analysis can affect the elaboration and systematic verification of diverse treatments which hopefully will assist the instructional process in physical education.

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Why Do Research on Teaching?

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Why do research on teaching? Research is the pursuit of knowledge, an attempt to solve problems. The function of research on teaching is to find answers to questions about teaching behavior; it's nature and it's influence. It appears clear from research reported by McDonald, Soar, Brophy, Stallings, Good, and others, of all the variables which affect learning outcomes, of which the teacher has influence, none has more significance than the teacher's behavior (Rosenshine and Furst, 1973; Borich, 1977).

Basic research is said to deal more with conceptual issues, generalizations, whereas applied research focuses more on practical matters. Basic research on teaching has attempted to validate paradigms of instruction and to define bedrock principles. Both kinds of research aim at generating new knowledge but, with reference to teaching, this popular dichotomy appears to be more imagined than real. This point will be expanded upon later.

What is teaching? Teaching is a social process which, although inextricably linked to learning in reality, has certain universal characteristics which can be studied independently. Included in the process are teachers, who they are and what they do, learners, who they are and what they do, and content or subject matter around which the goals of education are fashioned. This teacher/learner interaction takes place in a social milieu, which itself affects the process. It is a multivariate phenomenon which affects, and is affected by, other elements in the process and has, what Biddle has called, many "isolated curiosities." Many educational theorists have concluded their remarks about teaching with a plea for an over-arching conceptual model; a point of departure.

Mosston (1972) has provided such an over-arching schema, based on a decision making model, which has proven helpful to both researchers and teachers (Nixon and Locke, 1973). This schema, called "The Spectrum of Teaching Styles," provides a series of alternative teaching models, each with its own theory and operational procedures, from which teachers can make rational choices. The schema provides a framework which highlights the relationships among styles as well as their differences. It appears that other theories or models of teaching, such as those proposed by Smith, Flanders, Joyce, Nuthall, Kilpatrick, and others, while differing in their points of departure, are really parallel concepts; i.e. they are clearly describing and explaining the same phenomena.

It is often assumed that professional educators base their decisions on scientific knowledge. However, there are at least four sources of knowledge upon which people base their decisions.

Each source, because of its nature, is susceptable to certain limitations (Kerlinger, 1965):

1. Intuition. This is instinctive knowledge gained strictly through the personal experiences and thoughts of an individual. The quality of this kind of knowledge is, of course, limited to the perceptions, experiences and judgments of that particular individual.

2. Authoritative. This knowledge is based on the doctrines of power and tenacity. Something is true because a powerful source says it is true and it remains true because it always has been so. This knowledge is limited to the source of authority and is particularly susceptable in a democratic society (hopefully).

3. Common sense. Rational or inferential knowledge is gained through reason. A problem is approaches logically. This approach is limited to fallacious reasoning or the acceptance of invalid propositions.

4. Science. Scientific knowledge is based on objective information gained through systematic and controlled observation; i.e. through research. It is grounded on those things in reality whose characteristics are independent of subjective opinion.

It appears that, to date, most educational decisions, in all contexts, have been based on the first three sources of knowledge described above. The resulting decisions have often been chaotic, parochial, illogical and contradictory; in a word, "mindless" (not my word but Charles Silberman's).

One of the reasons for this confusion, not the only reason for sure, has been our lack of a valid body of knowledge about teaching. The way to build a rich body of knowledge is through systematic research; a quantitative approach. This approach has served us well in the natural sciences. With conceptual schemas emerging, such as Mosston's Spectrum, we should be able to design a plan, with clear steps and standardized procedures, for the creation of such a knowledge base. Having adequate knowledge will not by itself guarantee the quality of our decisions. Our commitment, determination, moral fibre and resourcefulness will affect the outcome. But trying to make important decisions, or even knowing decisions need to be made, in the absense of adequate knowledge is so much more difficult.

The excellence, or perhaps even the survival, of our educational programs and our profession will depend, in large measure, on the quality of the decisions we make. Our thesis is that the knowledge base gained through research can provide us with an invaluable resource in helping us make better decisions. This is true for the educational leader with the power to influence institutional change as well as for every teacher in every classroom or gymnasium.

A knowledge base about teaching does exist and is evolving. It is clearly not as well defined as some of the natural sciences such as geology or physics, but it does exist. We do know certain things about teaching.

In our continuing efforts to build upon this base, our research must be grounded on certain beliefs. Later, as we learn more, these beliefs can be subjected to systematic testing. Let us assume:

1. That universal models of teaching do exist. That teaching can be studied scientifically. (This is not to discount the subjective aspect of teaching; i.e. teaching as a creative art.)

2. That rational relationships do exist among differential teaching models.

3. That teaching is a multidimentional phenomenon which can be quantified.

4. That teaching behavior can be learned and that teachers can be trained to consciously control their teaching behavior to meet changing instructional conditions.

5. That differential teaching behaviors produce differential outcomes in learners.

It was suggested earlier that the popular basic/applied dichotomy was perhaps an overly simplistic approach to the study of teaching. In an attempt to provide a more well-grounded approach, one which more closely approximates the nature of the phenomenon, imagine in your mind's eye a multidimentional, translucent, matrix-like, spherically shaped model. Sounds fuzzy? You're not alone. This grand model must capture both the number and influence of the variables affecting the teaching process and the interconnective nature of these variables. I apologize for the vagueness in describing this idea but it is the state of the art at this point in time.

If we as a community of scholars can agree on a general outline for research and accept certain common operating procedures, we can then begin to formulate a plan to fill in the cells of the fuzzy matrix described, inadequately, above.

One broad-front approach to the study of teaching, the one we are pursuing today, suggests three categories of research (Dunkin and Biddle, 1974):

1. Descriptive-analytic research which attempts to observe and quantify the teaching process.

2. Process-product research which attempts to relate specific teaching behavior with differential learning outcomes.

3. Teacher education research which deals with the development of specific teaching competencies in students of education (which we all are).

In the first paper today, Professor Sherman will attempt the gargantuan task of briefly sketching in the boundaries of these three approaches and reviewing the major work which has been done so far. Professor Borrowdre will then review the work done in descriptive-analytic research and will present some of his own work. Professors Mueller and Yore will present research they've completed employing the process-product model. Finally, Professor Darst will review some of the work in applied behavior analysis research as it relates to the training of teachers.

In preparing this symposium our purposes were 1) to provide an overview of these approaches to research, 2) to offer some examples of the kind of research which has been done, and 3) to provide a forum for those doing research, or those interested in this kind of work, to discuss ideas, share findings and formulate plans. We believe that the pattern of the decisions we make now shall determine, in large measure, the character of our profession in decades to come. The quality of our decisions will depend, without doubt, on the information available to us.

To encourage research on teaching physical education, we are proposing that AIESEP sponsor an Academy on Teaching. With this kind of national impetus, researchers and practitioners across the country will have a specific forum to help us plan, implement and monitor research on teaching.

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Paradigms for Research on Teaching Physical Education

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Teaching is a universal human activity performed in schools, homes, workplaces, and other life settings. In fact, it is such common practice that it is seldom considered worth studying. After all, why ask questions about teaching when so many experts already know the answers? Nevertheless, questions are being asked because teaching, while done universally, is not always done well. During the past decade, a small group of scholars has ventured into physical education classrooms to discover the nature, determinants, and consequences of teacher behavior in the psychomotor domain. These excursions have given birth to the twin sciences of teaching and teacher education. Together, these sibling sciences promise to make physical education a more rational profession, therefore, distinguishing it from something less.

This paper serves as entry point for the 1978 AAHPER Symposium for Research on Teaching Physical Education. As such, it introduces the major problems and methods associated with studies on the behavior, effectiveness, and training of physical education teachers. The symposium provides "close encounters of the third kind" -- actual contact -- with some young explorers who have sought to unravel the mysteries of teaching. Their presentations synthesize the findings of research and, like my own, raise provoking issues for the next generation of pedagogical scholars.

Systematic Observation: The Common Element

Research on teaching is an umbrella phrase for three areas of inquiry: (1) teacher behavior; (2) teacher effectiveness; and (3) teacher education. Despite somewhat different orientations, these areas all depend upon systematic observation of instructional processes (Borich & Madden, 1977; Cheffers, 1977; Medley & Mitzel, 1963; Rosenshine & Furst, 1973). Process variables include the actual behaviors of teachers and pupils which occur during the classroom or interactive phase of instruction. They represent a wide array of pedagogical, managerial, and interpersonal events which, theoretically, have been planned to enhance pupil achievement of valued educational outcomes.

Process data come directly from live observation or indirectly from audiovisual records, descriptive protocols, or verbatim transcripts. The typical observation system focuses on selected aspects of the teacher-learner transaction. The target events must be clearly defined and require low to moderate inference by observers. These events can be organized to accomodate various levels of analysis. They can be expressed as a finite set of broad, mutually exclusive categories, specific subdivisions within categories, or split even further into smaller units. Another possibility is the multidimensional system. It not only classifies generic events, but describes other details such as an event's

causes, consequences, purposes, or participants. Once a system has been developed, a coding form is used to record the frequency and/or duration of events. Some systems tally events continuously, each time they occur throughout a lesson, while others record them only once per designated sampling period. Observation systems generate quantitative data, usually reported as measures of central tendency and variability. To obtain qualitative accounts about the presence/absence or strength/weakness of process variables, it is suggested that global poststudy ratings be made using Likert, semantic differential, scallogram, or checklist techniques (Borich, 1977). Global ratings demand higher levels of inference than do observation systems, however, they tend to remain quite stable over time.

The Teacher Behavior Paradigm

Teacher behavior research adheres to a descriptive-analytic paradigm (Anderson, 1971). The focus of such research is to identify and explain how teachers act when face-to-face with learners. The paradigm assumes that teaching can be separated into discrete elements which can be reliably observed and measured by trained raters. Discrete processes sometimes emerge from theory and empirical research. Quite often, however, they are simply extracted from previously developed observation systems. To date, the most frequently studied processes in physical education come under the headings of classroom climate, feedback, pedagogical episodes, managerial activities, instructional roles, interpersonal skills, nonverbal communication, pupil behavior, and teaching styles. In addition to providing insights about teaching, descriptive-analytic research has produced numerous observation systems which can be extremely beneficial for teacher training and evaluation. It has also created a new pedagogical language for describing many complex classroom phenomena.

Descriptive-analytic research findings suggest that "direct instruction" is the dominant model of teaching physical education. This model is characteristic of structured, businesslike, and teacher-centered classrooms. It includes high amounts of teacher talk, particularly lecturing, giving directions, and providing feedback, and infrequent teacher use of acceptance, praise, and questions. In the direct instruction environment, the primary teacher roles are to elicit, observe, and react to relatively narrow, predictable pupil responses. Pupils, on the other hand, tend to be obedient and subservient, rarely having opportunities to make decisions or produce original responses.

Some other interesting results have emerged. It appears that pupils often spend minimal time productively engaged in physical activity. They do, however, spend considerable time listening, watching, and waiting. In terms of content coverage, traditional sports and games are most prevalent, with little attention given to dance, movement education, or lifetime activities. As Metzoneger will soon report, the realities of physical education are vastly different from the humanistic and individualized programs advocated by many of our professional leaders. Unfortunately, current practices in school physical education can neither be accepted or rejected until we determine how they affect pupil growth.

While descriptive-analytic studies of teacher behavior have confirmed what we always wanted to know but were afraid to ask, they have left many stones unturned. They have identified the elements of teaching but have not shown how the elements fit together. Surely, teaching is greater than the sum of its parts! Future research should focus on the antecedents and consequences of discrete events and construct flow charts to illustrate how single moves merge into cycles, how cycles merge into episodes, and how episodes merge into models. In this respect, Morgenegg's (1977) study of pedagogical moves in physical education depicted the sequences of actions and interactions that make the teacher-learner relationship come alive. Bronfenbrenner (1976) has also suggested that classrooms be studied as ecological systems, using ethnographic and phenomenological methods, to obtain more holistic descriptions of educational events.

Now that the first round of teacher behavior research has ended, it is appropriate to speculate about the generalizability of recent findings. The existing databank has not revealed whether the behaviors observed to date are consistent occurrences, over time, or relatively rare happenings. Thus, it may be premature to make conclusive statements until we have enlarged our teacher sample. It now appears that many measures of teacher behavior are unstable and, therefore, do not provide trustworthy descriptions of how teachers really behave (Rosenshine & Furst, 1973; Shavelson & Dempsey-Atwood, 1976). Lack of stability indicates that certain teacher behaviors are context-specific, varying from one occasion to the next according to the tasks, students, and teaching styles involved in an observed lesson. Hopefully, commando raids upon physical education classrooms will be replaced by more longitudinal visits and repeated observations of the same teachers in multiple situations. It also recommended that such studies employ several observation systems, including both low-inference instruments and high-inference rating scales, which permit finding intercorrelations among variables and help to establish convergent and discriminant validity of instruments.

The Teacher Effectiveness Paradigm

The push toward competency-based teacher education has intensified the persistent search for measures of effective teaching in sport, dance, and exercise. Behavioral indicators of competence can be identified by (1) soliciting the professional judgement of experienced teachers and teacher educators, (2) defining the instructional processes associated with theoretical models of teaching, or (3) conducting empirical research to discover lawful relationships between teacher behavior and pupil achievement. The latter approach is called the process-product paradigm and has its roots in elementary school studies of teacher effectiveness (Brophy & Evertson, 1976; Good & Grouws, 1977; Leinhardt, 1977; McDonald, 1976; Soar, 1972; Stallings, 1977; Tikunoff, Berliner, & Rist, 1975).

Teacher effectiveness research measures process variables via systematic observation, rating scales, interviews, and questionnaires. Product variables, representing the intended outcomes of instruction, are assessed by standardized achievement tests, teacher-designed examinations, and various attitude or psycho-

logical inventories. Pupil growth is inferred from final performance, absolute improvement, or residual gain on product measures and is also used as the criterion for distinguishing more and less effective teachers. The residual gain method probably serves as the best growth index because it controls for the powerful effects of pupil entry ability on final performance. Once process-product data are collected, they are grouped and analyzed as classroom units.

Some studies calculate zero order and partial correlations to identify process-product relationships within sampled classes. Others dichotomize classrooms to make comparisons between more and less effective teacher groups. Leinhardt (1977) applied multivariate methods to isolate process variables that explained why some classes profited from instruction more than others. Recently, Leinhardt's model was adapted by Yerg (1977) to determine relationships between selected classroom behaviors of 40 preservice physical educators and pupil performance on a basic cartwheel task.

Initially, the multivariate model proposes a tentative framework for deciding what variables to measure and organizing the resultant measures into logical construct groupings. The framework specifies pupil achievement as the dependent variable and includes independent variables thought to influence final pupil performance following an instructional program. Assuming final performance will differ among classes, the model ascertains the relative importance of independent constructs for explaining observed achievement variance. In addition to process-product data, measures of pupil input, teacher input, and instructional context must be obtained. The inputs include abilities, aptitudes, and experiences that teachers and pupils bring to an instructional setting, especially those which might effect both the processes and products of instruction. Context variables are environmental factors that cannot be controlled (e.g. pupil age, sex, or SES; class duration, frequency, or size).

Obviously, the measurement plan will result in an enormous volume of data. Therefore, it is necessary to reduce and combine variables into meaningful sets, within limits imposed by the degrees of freedom. After inspecting descriptive and correlational data, many process items can be eliminated due to lowness in frequency, variability, or reliability or because they fail to correlate with pupil achievement. Variables with high intercorrelations may be combined or interchanged. The remaining variables are then converted to standard scores, with zero mean and unit variance, and summed to form composites for the respective constructs.

From this point in Yerg's study, two multiple correlation and regression procedures were employed. First, a "full" regression model found the proportion of achievement variance explained by all independent constructs. Second, a "restricted" model accounted for variance explained by pupil input alone. Yerg then applied analysis of variance to find out if there was a significant difference between the two coefficients of multiple determination. This step reveals whether teacher effects are at all responsible for achievement variance. Put another way, it tells whether teachers make a difference! After the general teacher effects are isolated, the relative importance of separate process constructs can be found by forward stepwise regression methods.

Although Yerg's study was unsuccessful in supporting "task presentation," "providing practice," and "providing feedback" as indicators of teacher competence in a microinstructional setting, the design and methods she employed could have considerable application in longitudinal research on teacher effectiveness in school physical education programs.

As reported for physical education, process-product studies in elementary school classrooms also reveal the prevalence of direct instruction. Across several investigations reviewed by Rosenshine (1973), it was found that small-step instructional procedures which are teacher-controlled, provide pupils with materials at their ability level, and offer fairly quick feedback are positive correlates of pupil growth. Other correlates are narrow questions, straightforward directions, and supervised seatwork. It was also reported that direct instruction was not always synonymous with dictatorial, joyless classrooms. On the contrary, concern, kindness, and positive feelings were frequent events in both structured and unstructured settings. The standout correlate of pupil achievement seems to be the actual time spent productively involved in academic tasks (also called "opportunity to learn"). This finding, which also emerged from Yerg's data, suggests the need to look more closely at the kinds of teacher behavior which promote pupil work involvement. Kounin (1970) and Stallings (1977) have already identified several pedagogical and managerial skills which minimize off-task pupil behavior.

Supporters of direct instruction may, at this moment, have little reason to jump for joy. The correlations between direct behaviors and pupil achievement have been moderately low. This suggests that effective teaching may involve the "orchestration" of numerous discrete variables. Furthermore, it has been found that direct instruction is not always appropriate. Apparently, it is quite effective for young children with low ability and socioeconomic status. Less structure seems better for older, more capable pupils. Soar (1972) found that teacher control and pupil learning were not linearly related. He observed an inverted "U" curve showing that too much and too little control retard pupil growth. He also found that teacher control was dependent upon task complexity. Less control seems congruent with difficult tasks; more control seems appropriate for less complex tasks. Singer (1977) expressed similar views for teaching motor skills. It now appears that having a wide repertoire of teaching styles is the common ingredient of good teaching, plus the ability to match styles with the nature of tasks and learners.

The Teacher Education Paradigm

Approximately 700 colleges and universities in the United States prepare physical education teachers. Each program receives official sanction from its parent institution, state education department, and the National Council for Accreditation of Teacher Education (NCATE). To obtain approval, a program must provide evidence that it selects, trains, places, and evaluates candidates who meet clearly defined criteria of teaching competence. The accountability mechanism associated with accreditation suggests teacher educators have accumulated considerable data about how and how not to develop effective teachers. If such knowledge

exists for physical education, where is it stored? The reviews of Peck and Tucker (1973) and Turner (1975) made no mention of research in physical education teacher preparation.

At present, teacher education programs are infiltrated by a conglomerate of separate subsystems which, hopefully, work together to crank out an effective teacher. One subsystem is the content mastery model which values intensive involvement with the movement arts and sciences. A second subsytem, the apprenticeship model, proposes that good teachers are developed by real-world clinical experience under the watchful eyes of seasoned practitioners. Thirdly, there is the analytic model which argues that teaching can be broken down into discrete skills and then extensively practiced in microteaching, peer teaching, and simulated classroom settings. In addition to the above approaches, humanistic teacher educators advocate sensitivity-type training, pedogogical kinesiologists want scientific studies to have relevance for the diagnostic-prescriptive roles of skill instructors, and behaviorists urge the gradual shaping of pedagogical acts through feedback and reinforcement.

The divergent perceptions about educating teachers offer an open invitation to research, not just to discover the best way but to figure out how to link the best of all models. The few who have accepted this invitation have usually worked under the experimental banner. Goldberger (1970), for instance, measured the classroom behavior of student teachers before and after exposure to various training regimens. A few years after he examined the effects of affective and cognitive training programs, the most serious teacher development research in physical education was initiated by Siedentop (1976) and colleagues at Ohio State University. The OSU team has successfully used applied behavior analysis and competency-based intervention to improve the managerial and interpersonal skills of preservice teachers. Elsewhere, there have only been a handful of single-shot studies concerning the behavioral effects of microteaching, performance feedback, and interaction analysis training.

There are other challenges for teacher education research besides experimental training studies. Very little is known about the nature of the teacher education talent pool. We ought to study the entry characteristics of teacher candidates to discover which, if any, personal attributes are predictive of success in the program, ability to secure employment, and effectiveness in the actual work situation. There is also some feeling that candidates with different characteristics may respond differently to various training programs(i.e. aptitude x training interaction). We should find out whether good teachers can emerge from divergent training experiences. The extent to which the behavior of trainees is influenced by university supervisors and cooperating teachers is another area of study. Do behaviors acquired through training persist during student teaching or beyond? Or, are novice teachers socialized by the establishment so that they behave like those already inside the system? There is some evidence to suggest that trainees revert back to their old ways when confronted by expectations and rewards different from those present during training. If, indeed, the chronic effects of teacher education are minimal, then perhaps we must intensify efforts in graduate and continuing education or admit the irrelevance of our present training systems.

Moving Toward Adulthood

Locke (1977) described research on teaching physical education as a "dismal science." It most certainly is not! It is just the newborn baby in our profession, susceptible to all the common illnesses which plague any young discipline. Berliner (1976) prescribed several cures for teacher effectiveness research and Locke (1977) offered his own eight-point plan for nurturing pedagogical research in physical education. Locke's suggestions for information retrieval, resource sharing, and informal consortia are especially appealing. From my own vantage point, however, we do not need another "invisible college" in our research community. What I envision is a highly visible Center for Research and Development on Teaching Physical Education, possibly patterned after the existing operations at Pittsburgh, Stanford, Texas, or Michigan State. Such R & D centers have attracted outstanding human talent and financial resources. They consider research on teaching serious business rather than a leisure pursuit. Until we can mobilize our own resources, however, all that is necessary for the baby to grow is a little tender, loving care from the members of its professional family.

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Descriptive Analytic Research in Physical Education

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The teaching process has been explored through three basic types of research strategies: descriptive, correlational, and experimental. Correlational studies have traditionally focused on the relationships between teacher traits and indicies of pupil achievement. Representative of the experimental strategy are those studies which attempt to show the effect of different instructional methodologies on learning or performance.

Although most research has traditionally involved the use of correlational, and experimental strategies, an investigative approach that is being used with increasing frequency is the descriptive method of research. This method of research involves the systematic observation of the teaching process from within the classroom or gymnasium. The term observation implies that the investigator has looked at gymnasium participants in action even though observations may have been made by mechanical means such as with audio or videotape recordings. The systematic nature of the observations implies that instruments or category systems were designed for noting or otherwise measuring events of the classroom or gymnasium (Dunkin and Biddle, 1974, p. 3).

Descriptive research in physical education is in an embryonic stage, with only a handful of studies being undertaken prior to 1971. Since 1971, a number of descriptive studies have been conducted. Many of these studies were a direct outgrowth of a videotape gathering project begun in 1971 under the direction of William G. Anderson of Teachers College, Columbia University. During this Data Bank Project, 83 videotapes of ongoing elementary and secondary physical education classes were gathered. This Data Bank Project is significant because it represents a sizeable and diverse collection of data covering gymnasium activities. Such a collection is unprecedented in physical education and infrequent in classroom research.

Three research projects that have grown out of the Data Bank Project are particularly of interest because of the relationship they bear to each other.

Barrette (1977) used a system designed by Anderson (1972) to monitor how elementary and secondary teachers spent their time in class. The core of this system is the function dimension which describes the purpose of the teachers' behaviors. The function dimension is divided into groups of categories (see Table 1). Of all teacher functions, the act of observing motor activities accounts for more than 20 percent of the teachers class time. Guiding the motor activities of students accounts for almost 1/3 of the teachers time.

TABLE 1
Percentage of Teacher's Time Devoted To
the Function Categories

FUNCTIONAL CATEGORIES	PERCENTAGE
1. PREPARING FOR MOTOR ACTIVITIES:	
1.1 Organizing	7.1
1.2 Preparatory Instructing	14.2
1.3 Providing Equipment	2.1
SUB TOTAL	23.4
2. GUIDING THE PERFORMANCE OF MOTOR ACTIVITIES:	
2.1 Concurrent Instruction	17.1
2.2 Officiating	7.5
2.3 Spotting	0.7
2.4 Leading Exercises	1.2
2.5 Intervening Instruction	5.6
SUB TOTAL	32.1
3. OBSERVING MOTOR ACTIVITIES:	21.1
4. PARTICIPATING:	1.1
5. OTHER INTERACTING RELATED TO MOTOR ACTIVITY:	6.4
6. OTHER INTERACTIVE BEHAVIORS:	
6.1 Administering	4.5
6.2 Establishing and Enforcing Codes of Behavior,	2.0
6.3 Other Interacting	3.8
SUB TOTAL	10.3
7. NON-INTERACTIVE INTERVALS:	
7.1 Dealing with Equipment	.6
7.2 Other Non-Interacting	4.1
SUB TOTAL	4.7
8. NONDISCERNIBLE INTERVALS:	
8.1 Insufficient Audio/Video	.7
8.2 Absent from Gym	.5
SUB TOTAL	1.2
GRAND TOTAL:	100.0

These and other data from the Barrette study should not be taken as an indictment against physical education teachers for not spending more of their time in substantive tasks. For example, even though much time was spent observing, these were observations of motor activities. Furthermore, these observations were frequently followed by feedback from the teacher about the motor act--a process critical to learning. It must be kept in mind that the duration of these functions was also quite short indicating a certain mobility of the teacher from pupil to pupil. This mobility was ostensibly for the purpose of meeting individual needs.

In contrast to Barrette's study of teacher activity, Costello studied what activities occupied the pupil's class time. Using a descriptive instrument designed by Laubach (1974), Costello (1977) observed a total of 193 elementary pupils for three 5 minute periods throughout the physical education class. Student activity was divided into 12 categories. Interestingly, awaiting accounts for

over one-third of the pupil's time. Over 70 percent of a pupil's time is spent either receiving information, or awaiting an opportunity to participate (see Table 2).

TABLE 2

Percentage of Pupils Time Devoted To To Function Categories

FUNCTIONAL CATEGORIES	PERCENTAGE
Practice	15.3
Game Playing	10.3
Exercise	3.6
Explore	0.2
Express/communicate	0.5
Position	4.1
Equipment	3.4
Assist	1.0
Diverge	0.7
Receive Information	25.4
Give Information	0.1
Await	35.4
TOTAL	100.0

The two studies cited so far have independently examined the duration, and frequency of either teacher or pupil activities. A study undertaken by the author had as its purpose the examination of the teacher and pupil as they interacted.

The system of analysis was based on the work of Arno Bellack and his study of the use of language in the classroom. His system consisted of four pedagogical moves or functions: structuring, soliciting, responding, and reacting. Through structuring, participants (teachers and pupils) set the context for subsequent events and behavior. In structuring, the teacher tells or otherwise communicates the activities for the day. The teacher may say, for example, "Today we are going to work on the balance beam."

Soliciting calls for an expected response from the receiver. Commands, imperatives, and interrogatives are solicitations. For example, a teacher may say, "Everybody come over here and form a circle." The response of the pupils to this command is an example of the responding move. A response is the reciprocal of a solicitation and occurs only in relation to it. Reacting serves to evaluate, modify, or rate the aforementioned pedagogical moves. For example, if a pupil makes a nice play in basketball, the teacher may say, "That was good. Keep it up."

An examination of all moves as they are distributed by teacher and pupil combined, reveals the respective roles of teacher and pupil (see Table 3). It is apparent from these data, that the teacher's role is one of soliciting and reacting, while the pupil's role is one of responding.

TABLE 3

Percentage Distribution of All Pedagogical Moves for Teachers and Pupils

SOURCE / Pedagogical Move		PERCENTAGE
Teacher		
Structuring		4.7
Soliciting		39.8
Responding		2.4
Reacting		15.7
	SUB TOTAL	62.6
Pupil		
Structuring		1.4
Soliciting		3.6
Responding		30.0
Reacting		2.4
	SUB TOTAL	37.4
	GRAND TOTAL	100.0

Regarding the use of solicitations, teachers used the direct form (commands and imperatives) more than 3/4 of the time and the indirect form (questions) only 15 percent of the time. Although pupils do not use the solicitation often, the indirect form is used more than the direct form.

Reacting is primarily a teacher role. In comparing elementary and secondary teachers on positive reacting, elementary teachers reacted positively twice as frequently as secondary teachers. Statements like "Yes, that's good", etc. occur twice as often at the elementary level as compared to the secondary level.

In order to examine the sequential nature of teaching, predetermined combinations of pedagogical moves were generated by Bellack (1966) and were identified as teaching cycles (see Figure 1).

The teacher solicitation, pupil response cycle (SOL, RES) was the most frequently used (51.5%). An example of this cycle would be: a teacher asks a pupil to do a forward roll, and the pupil responds by doing the forward roll.

Of particular interest is the solicitation (SOL) cycle. This cycle is characterized by the teacher giving a command for which he or she expects a response; no response, however, is observed because either the response is delayed or the teacher moves away from the area. According to these data, almost 20 percent of the time, the teachers didn't observe the response they solicited.

Several conclusions might logically be extracted from these descriptive studies. The traditional methodologies - teacher dominance and directiveness, minimal pupil involvement in decisions - persist in spite of the zealous efforts of authors, philosophers, humanists and practitioners to implement innovative strategies or curricula for our public school physical education programs.

A more careful examination of the data indicates that the teaching process across various physical education settings and grade levels and activities is remarkably similar. The similarity

of the teaching process is particularly striking when comparing classroom and gymnasium teaching - at least in terms of the pedagogical process of structuring, soliciting, responding, and reacting.

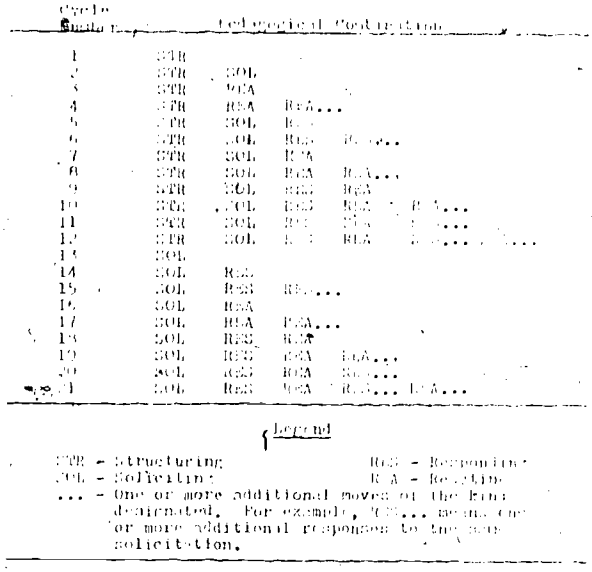

Figure 1 Teaching Cycles and Their Assigned Number. (Source: Bellack, 1966, p. 10).

Admittedly, these results are tentative, particularly given the absence of a larger sample, and the use of inferential statistics. The results may also have been influenced by a lack of sensitivity of the instrument used. However, there is wisdom in continuing this kind of research. If for no other reason, descriptive research helps to systemize our views of the teaching process. Systemization and orderliness are necessary forerunners of meaningful correlational and experimental research.

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Identifying Teacher Behavior Correlates of Pupil Achievement

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Two youngsters are running away from home. One asks, "Where are you going?" to which the other replies, "I don't know." Then how will you know when you get there? is the puzzled response. Sometimes our educational ventures might be characterized in much that same way.

The target of a curriculum, a unit of instruction, a lesson or an episode is to bring about some change in behavior, that is, learning. In physical education we seek to promote the adoption of a physically active lifestyle. To develop and maintain such a lifestyle, the individual must possess a level of physical skill accompanied by knowledges and attitudes conducive to continued involvement. As physical educators we try to help learners develop knowledges, attitudes, and skills that will enable them to participate at a satisfying level and thus increase the probability that activity levels will persist.

The question that emerges is - - what teacher behaviors are effective in facilitating motor skill development? To answer this research question, the teacher-effectiveness paradigm, a process-product design, is used. The paradigm utilizes 1) a criterion of effectiveness such as a measure of pupil achievement (the product) and 2) measures of teacher behavior, the process of the teaching act. The process measures are used to explain variation in the product or criterion measure after controlling for pupil entry characteristics. Stated another way, the procedure is to describe how classrooms differ and relate these variations to differential pupil achievement.

Such research is currently being conducted in the cognitive domain by a limited number of researchers. Results have shown that effective teacher behaviors vary with subject matter and age level of learners. This procedure has not been used to study effective teacher behaviors in the psychomotor domain and therefore, no prototype was available on which to build. It was assumed that there would be similarities as well as differences in research in the psychomotor domain.

The research traditions that have been used in physical education may be described briefly in three ways: 1) motor learning, where the treatment (process) is manipulated with the outcome (product) being measured; 2) classroom methodology, where the process is a specified method, usually not described or measured with regard to the individual teacher, and again, the outcome is measured; and 3) descriptive-analytic, where the process of teaching is described and quantified, but the outcome is not measured. While these research approaches provide much information, none measures both the process and the product and therefore, does not answer the research question being asked. A multidimensional approach is needed to study teaching-learning in context.

Methodology

The following procedure was used to gather data on the problem. Each of forty pre-service physical education teachers taught a twenty-minute motor task lesson to three randomly assigned elementary school students from grades three through six. The motor task was the cartwheel, selected because 1) it was sensitive to teacher intervention; 2) as measured, would reflect body control, a stage of development characteristic of the age group; 3) performances could be objectively measured with magnitude of deviation; and 4) changes could be expected as a result of a twenty-minute instructional session.

The cartwheel performance was measured in both horizontal and vertical planes. Using a parallel-lined target area, pupils were instructed to do the cartwheel trying to place each hand and foot in the target lane. Corresponding vertical target lanes were used to analyze and score vertical alignment of filmed performances. Pupils were performance tested immediately before and immediately after the instructional session. Cartwheel performances were recorded on movie film. By standardizing the instructions to teachers and the teaching context, the only variation between the pretest and the posttest was the instructional session. These sessions were videotape recorded for later analysis.

Teacher behavior constructs were factors hypothesized to facilitate achievement on the cartwheel, namely, teacher mastery of content; clear, concise, and specific task presentation; providing for and supporting practice; and providing specific, task-related feedback. Content mastery was determined by a written knowledge test and a performance test on the cartwheel. The teacher behavior process variables were measured by time-sampling the videotaped instructional sessions. Three five-second periods per minute, totalling sixty observations per lesson, were quantified using a specially designed Teacher Behavior Observation System (TBOS). The teacher behavior was first classified in one of the four generic categories; task presentation; providing for practice; providing feedback; and other, for behaviors not able to be classified in the other three categories. The behavior was then described in depth, in terms of communication mode, target audience, timing, intent and referent of the communication. These teacher behavior descriptions were recorded on the TBOS tally sheet. Scores from specific cells of the tally sheet were used as measures of the behavioral indicators of the constructs as defined. The scores were transformed to standard z scores (zero mean, unit variance) and summed with appropriate weighting to form composite scores for each of the constructs.

Analysis

Multivariate approaches in the study of teacher effectiveness are congruent with the multiplicity of behaviors involved in the teaching-learning interaction. Multiple independent variables and sets of variables are selected to describe aspects of interactive teaching in an attempt to relate these aspects to specified learner outcomes. It should be noted that multiple

dependent variables would further portray reality; but this was beyond the scope of the present study.

In this study multiple regression analysis was used to explain variation in pupil achievement on a motor task in terms of selected combinations of independent variables. Simultaneous full and restricted model multiple regression equations were formulated. The restricted model described pupil final performance as a function of pupil initial performance. This relationship had importance as it defined the effect of pupil entry behavior on subsequent achievement and also determined the amount of variance remaining to be explained by other factors. Examining the residuals in the restricted equation determined the appropriateness of the linear term for pupil initial performance. The full model regression equation explained variance in pupil achievement in terms of initial performance and the teacher behavior constructs. This analysis described the effects of each independent variable and the set of variables on pupil achievement, the dependent variable. The use of the simultaneous equation analysis provided a means for isolating the effects of the teacher behavior constructs.

Order of input of variables in a regression equation can effect the outcome of the analysis. Theory and empirical judgement were used in determining order of input for this study. A forward stepwise regression analysis was run to determine appropriateness of the selected order of input and the relative effect of each independent variable on pupil achievement.

Results

The data for the restricted model showed a strong, positive relationship between pupil initial and final performance ($R = .867$, $p < .001$). Seventy-five percent of the variance in final performance on the cartwheel task was explained by pupil initial performance ($R^2 = .75$). The significant difference between pretest and posttest scores on the cartwheel ($t = 8.94$, $p < .001$), indicated that learning had occurred. The data for the full model showed an additional two percent of variance on pupil final performance explained by the teacher behavior constructs ($R^2 = .77$). The difference between these coefficients of multiple determination was statistically nonsignificant. As the contribution of the set of teacher behavior constructs in explaining variance in pupil achievement was statistically nonsignificant, the contribution of individual teacher behavior constructs was also statistically nonsignificant. The forward stepwise regression analysis confirmed the order of input of the variables in the analysis as appropriate. This has limited meaning due to the statistical nonsignificance, however, it supported the procedure and has implications for subsequent research.

Descriptive data substantiated that teachers exhibited considerable variability in their conduct of the lessons. Learner achievement scores also showed a range of variability, however, relationships between teacher behavior and learner achievement were not established.

Discussion

This study was designed to control for internal validity and external validity was limited. These results represent one study with one motor task and thus are cautiously interpreted.

The relationship between pupil initial and final performances indicated that achievement is strongly determined by pupil entry characteristics. The independent variables of pupil initial performance and teacher behavior are significant in explaining variance in pupil achievement, but not significantly better than pupil initial performance alone. That is, as defined and measured in this study, the teacher behaviors of content mastery, clear, concise, and specific task presentation, providing for and supporting practice, and providing specific, task-related feedback did not make a significant difference in pupil achievement. It would be irresponsible to conclude that these teacher behaviors do not make a difference.

Researchers in the cognitive domain have reported four to fifteen percent of variance in achievement available for teacher effects over an academic year. One might speculate whether the two percent from the micro-setting of twenty minutes might increase in the macro-setting over the school year. In cognitive domain studies, the relationship between initial and final performance is much higher. This leaves less variance to be explained by other factors. If the relationship from this study holds, there may be greater teacher effects possible in the psychomotor domain. In addition, there may be differences in relationships for varying tasks, skills, and age levels. Much more research is necessary before definitive conclusions are forthcoming.

There is still the perplexing question of the twenty-three percent unexplained variance in this study. The study confirmed the process of identifying effective teacher behaviors in the psychomotor domain as appropriate. However, some weaknesses seem apparent in identifying and quantifying the appropriate behavioral indicators. Current research in progress may serve to provide additional information to further this research approach. Pease and his colleagues at University of North Florida are developing a theoretical model of teacher behaviors essential in promoting physical development. Based on Harrow's taxonomy of movement and a teacher education model paralleling Gentile's model of skill acquisition, they are currently validating instrumentation to measure the specified teacher behaviors. Singer and his colleagues at Florida State University are conducting research to identify cognitive strategies utilized by learners in acquiring motor skills. Others such as Goldberger at Temple and Cheffers at Boston are directing studies on patterns of teacher behavior that facilitate specific learner outcomes. These research endeavors may well fill in some of the gaps needed to further the identification of correlates of teacher effectiveness in the psychomotor domain.

The prognosis seems encouraging that we are on the threshold of developing a research base for teacher education in physical education.

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Professional Football Circa 1928-1940

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Journalists and sports historians have provided many insights concerning the growth of professional football since World War II. But research does not provide much factual detail about professional football during its embryonic period, the 1920's and 1930's.

Some of these early events are portrayed by the brief, but eventful professional career of Ken Haycraft, All-American end at the University of Minnesota in 1928, who later played for the Minneapolis Red Jackets and the Green Bay Packers.

Haycraft's early career, by modern standards, would be a rarity. First of all, Haycraft did not play football at his high school, Central High School in Washington, D.C. Secondly, Haycraft did not go out for the football team his freshman year at the University of Minnesota in 1924. Haycraft became a so-called "walk-on" candidate in his sophomore year in 1925. Coach Clarence Spears encouraged Haycraft and, although Haycraft was only six feet tall and weighed 175 pounds, he showed Dr. Spears enough football savvy to be retained on the team. Eventually Haycraft played regularly on Minnesota's undefeated team of 1927 and was selected to Grantland Rice's All-American team in 1928.

Upon graduation, and with the assistance of Val Ness, a butcher, and John Dunn, a postal clerk, a professional franchise was organized in Minneapolis. A professional team was composed of not more than eighteen players, and players were expected to play both offense and defense.

League teams were located throughout the Midwest and along the Eastern coast. Schedules consisted of approximately sixteen games, including a maximum of four exhibition games. Crowds of 5,000 fans were considered average at this time, except for games involving Red Grange and the "Monsters of the Midway," the Chicago Bears.

The Minneapolis Red Jackets completed their first season in 1929, winning only two games and finishing financially in the "red." By 1930, the depression had taken a heavy toll and efforts to rescue the Red Jackets were fruitless. Three of the players, including Haycraft, were sold to the Green Bay Packers.

The history of the Green Bay Packers is legend and it was to Haycraft's advantage to be associated with a first rate operation, coached by the legendary Curly Lambeau. Haycraft, smallest member of the team, played in the second game of the season against Ernie Nevers and the Chicago Cardinals.

Unfortunately, Green Bay was detected to be carrying twenty-tow players, rather than the maximum of eighteen players. Thus

Haycraft, along with three other players, was released by Green Bay before the final game of the season for the league title.

The following year, 1931, Haycraft attempted to sign with the Detroit Lions but was unsuccessful in his efforts. Haycraft's football playing career did not end entirely. Haycraft was pursuing a law degree at the University of Minnesota, so he returned to Minneapolis. He organized a semi-professional team, in which Haycraft was owner, general manager, coach, and player. The team consisted of only thirteen players and the team played in a semi-pro league for six seasons against teams from Minnesota, Iowa, and Illinois. The advent of World War II brought an end to the semi-pro league.

Basic offensive strategy centered around the single-wing formation, the double-wing, and the short punt formation. Defenses were basic, consisting of a five or six man line and a minimum of "stunting" or "blitzing." On a passing down, there would be shifting to cover potential pass receivers, and generally, the defensive middle center or middle guard, who was strong, fast, and agile, was at liberty to move anywhere he wished on any play.

Quality of play would be hard to compare with the modern-day game, except Haycraft believed players were in better condition in the earlier days, since the limited number of players (18) placed great stress on conditioning. The player's endurance and stamina were often taxed. Haycraft recalled playing a game in Frankfort, Pennsylvania, on a Saturday, then traveling by train to New York City to play Ken Strong and the Staten Island team on Sunday. While in New York, the team stayed in a first class hotel near Central Park. The players dressed in their uniforms while in their rooms, then walked from their hotel to Central Park in tennis shoes and practiced, often to the delight of pedestrians, and with no fear of molestation.

Haycraft, who could reflect from both the intercollegiate and professional viewpoint, believed that professional football was not as "dirty" as intercollegiate football in the late 1920's and early 1930's. Early stories reported that George Trafton of the Chicago Bears was reported to be a "dirty" player, and that some of his tactics helped earn him a berth on the All-Pro football team. Generally, one's own teammates would tell a player like Trafton to "clean it up," lest he aggravate the opposing team into a slugfest.

In summary, it was Haycraft's opinion that in the 1930's one did not have to play football in high school to be successful in college play, citing himself as one of many examples. Haycraft believed that coaches of the modern day (1970's) concentrate so heavily on the high school athletes who receive the headlines and are selected for All-Star teams, that the non-experienced athletes or walk-on students are too frequently ignored or shunted to the sidelines.

In retrospect, professional football in the late 1920's and early 1930's reflected an aspect of the sporting world, which was exciting, entertaining, and almost unbelievable in some respects. The game played by Haycraft was filled with obstacles not solved by the technological advances evident in the 1970's. Thus although the modern game may reflect great advancement in training and playing techniques, the earlier game displayed basic values and objectives which allowed the game to emigrate from its embryonic stages to a full-fledged entertainment spectacle.

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The Decline of the Cycling Craze of The Mauve Decade: A New Approach

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INTRODUCTION

The demise of cycling around the turn of the nineteenth century was not a gradual process, but a sudden eclipse. Many writers of the time detailed the fadlike popularity of the sport during the period 1890-1900, and its sudden reversal in fortune between the years 1900-1905 was documented in many contemporary periodicals. In 1905 the Scientific American (10) recorded that "the history of sports and pastimes in this country furnishes no parallel to the rapid growth in popularity of the bicycle, and its even more sudden decline as a means of recreation" (p.234).

The sudden decline of cycling as a mass recreational sport has still remained something of a mystery. Writers have posited various reasons to account for the reversal in the fortunes of the bicycle ranging from the invention of the automobile to the problems of dress. However, historical evidence suggests that these explanations might be inadequate and that the cycling fad collapsed in great measure because of certain long term changes in the social status of women which were irreversible. While the importance of women in the rise of cycling has been considered elsewhere (2,9), no contemporary or secondary analysis has examined the role of women in the abrupt demise of cycling which took place between the years 1900-1905. Indeed, the fact that the decline of cycling coincided with the emancipation of women in many other circumstances has never been taken into account by the historians of cycling. The result of the women's movement during the latter part of the nineteenth century was nowhere more noticeable than in the dramatic increase in the participation of the American woman in a wide variety of sports as a result of and at the expense of the cycling craze. Consequently, it is suggested that the major reason for the decline of the cycling craze during the period 1900-1905 was not as hitherto forwarded by the historians of cycling, but due to the changing patterns of women's participation in sport during the same crucial period.

In order to investigate this hypothesis the present paper is divided into three parts; namely, (i) the decline of cycling, 1890-1905, (ii) the rise of women in sport, 1890-1905, and (iii) the rise of sport in the Physical Education curriculum for women, 1890-1910.

THE DECLINE OF CYCLING: 1890-1905

Both contemporary and secondary analyses have offered various explanations to account for the decline of cycling. Most writers have subscribed to the commonly accepted view that the popularity of cycling waned because of the emergence of the automobile (e.g., 9,11). However, during the first decade of the twentieth century the motor car was still predominantly a pastime of the aristocracy. While Rene de Kuyff may have had the Prince of Wales as his pupil, and Lambajad may have taught the Duchesse d'Uzes to drive a car,

for the most part the automobile was not yet an universally economic proposition. By 1913 there were still only 60,000 cars in the entire country. It was only with the developement of the assembly line by Henry Ford in 1914 that the motor car began to reach the hands of the average American. Although the motor car may have detracted from the publicity previously thrust upon the bicycle, it was only after 1918 that motor cars became even fairly common.

The arrival of the trolley car and the building of trolley lines was also heralded as a cause of the decline of the bicycle, primarily on the grounds that it "afforded an opportunity to get into the country without the necessity of working the passage" (1, p. 906). However, this would seem to mitigate against the very advantage of the bicycle in that it permitted relative freedom of movement and the possibility of independent travel. During the 1890's thousands flocked to the countryside and picnic areas around the cities just because, for the first time the bicycle made it feasible. Furthermore, trolley and street car lines were already well established by the late 1890's. One commentator even suggested that it was the bicycle that had the adverse effect on the street car trade (3).

Other sources suggested that the concentration of bicycle factories under great monopolies prostrated cycling. It was reported in 1904 that 45 factories had been brought under one management (1). It was also propounded that the suspension of advertizing lost wheeling the support of the press and contributed to the collapse of the League of American Wheelmen However, the failure of the Trust and the dropping enrollment in the League of American Wheelmen would seem to be symptoms of the decline of cycling rather than a direct cause. The production of cheap bicycles in England had merely meant a flooding of the market, not the end of cycling.

Other reasons were called upon to explain the demise of cycling, including the physical distress caused by wheeling (10) and the problems of dress (1). It was even suggested that the decline of the sport was due to the lack of an independent democratic spirit among the American people (10).

While these views would certainly appear to offer some explanation for the demise of the cycling fad, they do not seem to account in full measure for the dramatic change in participant behaviour which occured between 1900-1905. Since women played a decisive role in the origional growth of cycling, it would seem not unreasonable to suggest that they might also have played a fundamental part in its decline. The demand for bicycles by women had in great part generated the market for the manufacturers in the mid and late 1890's. A shift in female patterns of behavior might to a large extent explain the collapse of cycling only a few years later. And, indeed, it was precisely at the time that the cycling craze collapsed that women emerged in no small measure in other sports. It was also at this time that sport finally became accepted as an integral part of the Physical Education curriculum for women in colleges and universities across the country. By 1900 for the forst time the American woman was no longer restricted in her choice of sport. Moreover, this was due in great measure to the pioneer services of the bicycle.

THE RISE OF WOMEN IN SPORT: 1890-1905

Of those factors which contributed to the acceptance of the

American woman on wheels, the reform in dress code and the change in attitudes towards the physical and health benefits to be accrued from cycling had the most widespread impact on the participation of women in other sports and recreation. Through these innovations the bicycle opened a new vista for the average woman. As Krout (8) noted, the victory won on the bicycle "served as the medium through which women entered into the sport life of the nation" (p. 148).

According to Gerber (6) the rationalization of women's dress through the sport of cycling "marked the beginning of women's emancipation from restrictive clothing and therefore has been credited by historians as being one of the important hallmarks of the feminist movement" (p. 33). Although at first ridiculed and condemned as immodest, the 'bloomer' eventually became an accepted part of women's sporting fashion. By 1899 one commentator could advocate: "This garment, coupled with a waist and leggings, forms a neat, practical dress for a woman rider" (5, p.583). Before the turn of the century, bloomer dances were held in Chicago and a bloomer brigade even invaded a Long Island baseball field and demanded to play.

Throughout the latter part of the nineteenth century the lack of health and vigor among American women caused many to seriously question the Victorian ideal which had propounded a limited view of the female's physical capacity. As bicycling became increasingly popular as a mass recreation for women in the 1890's, many articles appeared in support of the physical benefits to be gained by the sport. Although strenuous physical exercise had long been advocated for men "prejudice alone had prevented this view being held with regard to women" (4, p.807). The writer further declared that "cycling is the ideal exercise to bring about a revolution in this respect" (4, p.807).

The resultant effect of the changes wrought by the cycling era was a rapid increase in the participation of women in all varieties of sports. Nor was this fact lost on the commentators of the time. For example, in 1903 Hill (7) wrote:

> Not until one's attention is thus directly attracted to the variety of gymnastic exercises, sports, and pasttimes now enjoyed by women, does one realize how much has been done in a very few years to interest us in physical activity as a curative agent and a recreation. And the list could be even longer with all honor to the pioneer services of the bicycle. Handball, squash, racquets, lacrosse, and cricket have their devotees, and fisherwomen, campers, canoeists, and gardeners believe the most attractive forms of activity in the open have been omitted (p.1).

There was also a dramatic increase in womens' participation in organized sports such as tennis, golf, fencing, bowling, and archery. This development was facilitated both by the establishment of athletic clubs specifically for women and by the opening of the membership to women on behalf of the existing men's clubs.

One of the first and most prominent of the women's athletic clubs was the Ladies Club of the 'Staten Island and Baseball Club' which was founded in 1877. By 1897 the original membership had grown from thirty to over three hundred. Many other clubs were founded during the 1880's and 1890's including the Crescent

City Female Archery Club, the Ladies Berkely Athletic Club, the United Bowling Club of New York, and several women's rowing clubs. In 1891 the Shinnecock Hills Golf Club became the first organized women's golf club. There were also many men's clubs which increasingly began to admit female members. In 1889 Slocum (12) noted that "to enumerate and describe all of the clubs in the neighbourhood of New York City which gladly welcome ladies to membership would be an almost endless task, for in the state of New Jersey alone there are quite too many to be described in one article" (p. 292). Nor were these athletic clubs restricted to the East coast, but they became a phenomenon all over the country.

THE RISE OF SPORT IN THE PHYSICAL EDUCATION CURRICULUM FOR WOMEN, 1890-1910.

Another fact overlooked by the commentators of cycling was that the establishment of sport as an integral part of the Physical Education curriculum for women took place not after 1910 as most writers have purported, but during the years 1890 and 1910 (13). The introduction of sport into the women's Physical Education curriculum prior to 1890 and its acceptance during the Mauve Decade had a profound effect on female patterns of sporting behavior. Women were no longer restricted to the more genteel games of tennis and golf, or to the mass recreational sports like croquet and, of course, cycling.

By 1890 fourteen different sports including football, track and field, crew, baseball, and swimming had been introduced into institutions as varied as private women's colleges, private coed institutions, state universities, and state normal schools (13). The period 1890-1900 was marked not only by vigorous programs to extend sporting facilities, but also by the integration of sport into the instructional program. Fifteen different sports were part of the instructional program in women's colleges from east to west coasts before 1900; sixty per cent of them being incorporated during the Mauve Decade. During the same period, and as a result of efforts by students and faculty alike, twenty-three sports were represented in recreational programs and seventeen sports at the club level, at institutions of higher education for women (13).

The invention of basketball in 1891 and volleyball in 1895, and the importation of field hockey from England in 1897 had a widespread impact on women's sports programs across the country. In 1903 Hill (7) wrote of basketball that "It is by far the most popular game that women play" (p.7). Many other sports were added to curricular and recreational programs, including track and field at Mount Holyoke and the University of Nebraska, and cricket at Smith and Winthrop Colleges.

Unlike her predecessor, the female graduate between 1890 and 1910 was increasingly well grounded in a wide variety of sporting experiences. Furthermore this seasoning in sport was carried away from the campus and merged with the trend in the larger society which at the same time was facilitating the growing interest and participation of women in all types of physical exercise. By 1905 in colleges and universities across the United States women received instruction, enjoyed recreation, and witnessed the organization of clubs in most of the major sports and recreations of the day.

CONCLUSION

In the final analysis it would appear that the abrupt demise of the cycling craze around the turn of the nineteenth century may be accounted for in great measure by the dramatic changes in the social status and sporting habits of the American woman. Cycling became the focal point of women's fight for dress reform and participation in physical exercise. The successes gained on the bicycle provided a significant impetus for the advance of women into many other diverse sporting arenas, as evidenced in the increased participation of women in all varieties of recreation and sports, the widespread organization of women's athletic clubs, and the growth of sport within the women's Physical Education curriculum in higher education during the period 1890-1905. While historians have concentrated on various explanations to account for the sudden demise of cycling, they have hitherto ignored the role of women in this phenomenon. It would seem that the cycling craze may well have collapsed in fact because that section of society which had initially "taken to the sport with no less enthusiasm than men" (5, p.578), left it with a much greater enthusiasm for a wider choice of sporting alternatives.

Finally, the fact that the increased involvement of women in sports was intimately linked with the strife for women's rights during the same crucial period between 1890 and 1910 requires further investigation. As Betts (2) has noted, "women have frequently played a decisive role in the growth of American sport" (p.153) - and perhaps nowhere more decisively than during the decades around the turn of the nineteenth century.

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Origins of the Connection of PE and Athletics at the University, 1890-1930: An Organizational Interpretation

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I propose a reanalysis of the period 1890-1930 which saw the beginnings of the connection of intercollegiate athletics and PE. I will use the tools of formal organizational theory in an attempt to present a macroscopic analysis.

Definitions. A formal organization is a formally established organization expressly constructed for the purpose of achieving explicit goals (3). The university and departments of PE are examples. Formal organizations exist within a task environment. Task environments are those parts of an environment which are relevent or potentially relevent to goal setting and goal attainment (19). Task environments may be conflicting or contradictory (10). For example, in American society one part of the environment (university faculty) may hold a very important resource for PE (legitimacy) necessary for goal attainment. Another part of the task environment (state legislatures and alumni) may control other resources (money) for the department and the university.

The "open systems" perspective employed concerns itself with the interchanges of the organization and the various components of the task environment. In this view, departments of PE must continually negotiate with administration, faculty, students, the general public in order to acquire the resources necessary for existence (eg., faculty, money, legitimation, students). The open systems theorist holds that the organization is symbiotically related to the environment, taking from it necessary inputs and returning to it goods and services. In return for vital resources departments of PE must return trained teachers and coaches, knowledge, fitness, etc...

Hypothesis. The general line of my argument is as follows: With expansion of the universities in the era 1890-1930, the university as a formal organization required a "smoothening" of fluctuation in the flow of resources (money, visibility, students and the support of faculty.) In some institutions intercollegiate athletics, primarily football, became a means to that end of expansion through the flow of resources attracted. Similarily, with expansion of departments of PE during this period, departments as formal organizations required resources in the way of money, students, faculty and significantly, the support of the university leadership. The means to this end was acceptance of the incorporation of athletics within departmental responsibilities.

Both the university and PE grew during the period 1890-1930. With America's growing interest and resource investment in sport came the need to include athletics in some educationally rationalized and legitimized form into the university--hence affiliation with PE. This promoted the acquisition of resources and growth of the university and departments of PE.

The Rise of the University. Throughout the 19th century there was a strong undercurrent of political and public opinion that colleges were to exclusive. This was evidenced by the successful

land grant movement of the 1860's. Spurred by the growth of such institutions, enrollment doubled every 15 years beginning in 1870 (12).

Confidence in the stability of these institutions however, enlarging as they were, was not necessarily great. Before the depression there was a "continuing campus concern for adjustments to external forces that could bring improvement in support and a greater consensus on purpose and future directions" (9). This uncertainty was not only manifest in fluctuating enrollments, but also in unstable financial conditions of most institutions (9). Ross (1976) sites the insufficient funding of the years immediately before and after WWI. Such instabilities left faculty and supportive staff under continuous financial threat.

The Development of PE at the University. The early directors of PE, among them Sargent (appointed at Harvard in 1879) and Anderson (appointed at Yale in 1887) did not see the control of athletics or its staffing as part of their department's responsibilities (14).

The rise of PE may be traced from Hooker and Hitchcock at Amherst in the 1860's. By 1921, of 231 schools surveyed, 86% had a PE department. Contrary to the beliefs of Sargent and Anderson however, in these departments 82% of staff were engaged in athletic coaching (7). Obviously in the period 1879-1921 there had been radical shifts in the structure of PE. They were (1) an enormous growth in the number of colleges with departments of PE, (2) PE staff were legitimized and accorded faculty status, and (3) there had developed a close bond between athletics and PE.

The Formal Organizations of College/University and Physical Education. A task before all organizations is the management of its dependency on the environment. Vital resources which provide the lifeblood of the organization must be ensured and fluctuations in flow reduced. Establishing a position in the athletic market may compensate for fluctuations in demands by the task environment for other outputs of PE. In such a fashion the long run viability of the organization may be increased. When the organization is constrained in some sectors of the task environment it may seek to enlarge its task environment in areas where it is not constrained (19). Athletics provided that opportunity for the organization of PE. With the burgeoning growth of sport in the period about the turn of the century, PE had before it a field technologically similar to its own. In addition with the mismanagement of sport by students and alumni there existed a vacuum of control which further increased the opportunity apparently open to PE. Intercollegiate sport had awesome visibility and was tremendously popular with the student body as it was with another significant component of the task environment, the alumni. With student and potential student and alumni support (both vocal and monetary), and similar support from state legislatures, administrators of the tenuous university/college may have also become enthusiastic about athletics. The liability which intercollegiate athletics could potentially become to PE may have been visible at that time, but that image was overshadowed by the resources and stability which inclusion of athletics in the PE department's formal structure could provide.

From where came the environmental pressure? We are all familiar with the traditional legitimany problems of PE within academia. The problem is one historically noted and traced by some to the Puritan ethic (5). Another source of the problem may concern the

proper "domain claims" of the university. Institutions are defined by society as legitimate partly on the basis of the propriety of the technology employed and the outputs which are the objectives of the institution. The university traditionally claimed to develop the minds of men. The technology employed was typically the classic-mathematics, Latin, and eventually, the techniques of empirical investigation. Inclusion of PE within the university was resisted partly because of the seeming inappropriateness of its technology and physical goals to the "proper goals" of the university.

Through the incorporation of athletics, PE may have gained support for its legitimacy from some, if not all, educational leaders. Betts' chronicling of support for athletics by college presidents in 1922 is most significant. In that year the presidents of the University of Chicago, Michigan, City College of New York, Iowa, Columbia, Middlebury, Bates and Princeton are all on record defending athletics (1).

From the perspective of the college president it is not suprising that athletics should be embraced by the institution. Funds were scarce and their flow was not guaranteed. Competition for resources existed between the various institutions and the various types of institutions (public vs. private)(18). At Notre Dame intercollegiate football was consciously developed in the 1890's as an agency of student recruitment. As Rudolph notes (1962:385):

> By 1900 the relationship between football and public relations had been firmly established and almost everywhere acknowledged as one of the sport's major justifications.

University presidents felt they needed athletics in order to attract students, obtain funds from the state and alumni (1). From their perspective the incorporation of athletics was understandable and rationalized as a necessary means of obtaining resources for an expanding educational organization.

The Rationalization of Athletics Within the Formal Organization of the University. The university which needs athletics for the resources it draws must somehow rationalize it within the "domain claims" of the university within American society. Institutions of higher education in the U.S. have traditionally sought to educate--this has been their broadest legitimized goal. Obviously athletics had to be rationalized as an educational activity. In addition, it had to be rationalized to various components of the task environment. The monetary resources argument for athletics' inclusion may suffice for other campus administrators, but may not quell the opposition of university faculty.

The means chosen for solving this problem of the rationalization of athletics within the university may be understood if one considers the organizational perspective. Certain programs and technologies are deemed by society as appropriate to specific organizations. This leads to a sense of the organization as rational, modern and responsible (10). Athletics during the period 1890-1930 was perceived as physically oriented activity. Its place among the university's more cognitively oriented programs and technologies was therefore questionable. Through connection with PE, however, a field already within the university the educa-

tional leadership could argue that it was indeed contributing to the goals and responsibilities of the institution. After all, the technologies of athletics and PE are perceived by the layman to be similar if not identical. The inclusion of athletics in the PE curriculum, incorporation of athletic personnel under the departmental title, lent an educationally rational veneer of justification to university athletics. PE, eager to increase its stability in the university, could hardly refuse the resources which inclusion of athletics could immediately bring.

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Movement and Its Relationship to Academic Concept Development. Illustration with Mathematics Principles.

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The influence of motor activity on child learning has been the subject of much study during the past two decades. General agreement exists that the effect is a beneficial one. A variety of methods have been advocated as the most effective means to derive this benefit. A logical approach to improvement of intellectual performance through participation in movement activities uses what Cratty (2) terms "cognitive models." Progress in intellectual and academic operations through movement is achieved by precisely pairing the movement activities with the intellectual qualities one hopes to develop. The application of this method will be subsequently described in detail. Other less compelling techniques include the "perceptual-motor approach" of Kephart (11) and Getman (6) which uses movement activities mainly as tools to heighten perceptual awareness in general; Delcato (5) suggests basic activities such as creeping and crawling to produce an adjustment of neurologic organization with anticipated improvement in intellectual and perceptual functioning; the "dynamic approach" based on work by Oliver and Kiphard stresses the improvement of a child's self-concept through motor development, which may then yield benefits in intellectual areas as well (2). None of these latter methods bring movement experiences into intimate relationship with the academic experience and would therefore not be anticipated to have as immediate and direct an impact as the technique described by Cratty.

Several authors have attempted to employ this technique in different ways. Cratty has experimented with movement games for teaching academic subjects. Materials in the form of number and letter grids as well as manipulative equipment are used. In his early work (1) many of the physical activities focused on jumping, hopping or skipping from square to square; subsequent works (2,3) on intelligence and behavior employ adaptations of more traditional physical education games and skills. Many of the activities appear designed for smaller groups (5-10 students) or require an open activity area.

Humphrey (9, 10) also has utilized movement games for improving intellectual function. His games often involve teams and competition. Many of the activities involve well-known games included in the elementary physical education curriculum. The emphasis is on walking, running and ball-handling skills; games are

designed to be enjoyable while simultaneously incorporating various academic concepts. The majority of his activities are for the primary grades. A noted researcher in learning and movement, Humphrey (10) has concluded that children generally tend to learn better through the motor activity learning medium than through many of the more traditional ones.

Penman et al. (12) have studied the use of active games to improve language arts skills in third grade classes. They compared the use of active or passive games with traditional methods of teaching concepts of capitalization and punctuation. They concluded that learning was enhanced significantly and most notably when active games were employed.

In Teaching the Three R's Through Movement Experiences, I have presented another way of pairing movement with learning. Instead of primarily utilizing games, a movement education approach is employed in which a variety of movement skills are emphasized. These incorporate the concepts of space, time, force and flow. In addition to teaching academic subjects, encouragement of creative thinking as well as improvement of self-esteem and peer-group cooperation are important goals. Little or no equipment is required. Activities are described for limited or large spaces.

Several advantages of this movement education approach are apparent. Because of the variety of movement skills involved, improved physical fitness and body awareness may be attained. Non-competetive movement experiences enable success for every participant which then provides each with a stronger self-concept. Opportunity for immediate feedback is available for both students and teachers. The ability to use movement experiences in limited classroom space has the advantage of encouraging greater use by the classroom teacher. In addition, activities which require more space are described for use by the physical educator. Consultation between classroom teacher and physical educator may further enrich the experiences.

Research in progress is currently investigating objectively the effect of the movement education approach on academic achievement. The study involves the systematic application of this technique to the teaching of language arts in two inner city elementary schools and two non-public schools within the Seattle, Washington school district (8). Students in 15 elementary classrooms will have their progress monitored by taking the Metropolitan Achievement Test-Language Arts Section before and after implementation of the training program. Their scores will be compared to a matched control population of students taught with traditional methods alone. Teachers and students in the study group have been given an initial eight hours of instruction in basic movement education which consists of exploration of space, time, force and flow concepts. In addition,

teachers received eight hours of demonstration of program techniques. Students are currently receiving two hours per week of language arts instruction incorporating these movement techniques. This training period extends over six months. In addition to test scores, informal evaluation in the form of teacher and principal interviews is being conducted. Using the table of random numbers, five teachers were selected to be interviewed after the initial 6 weeks of the program, five others after 12 weeks and the remaining five after 18 weeks. All fifteen teachers and four principals will be interviewed at the conclusion of the study.

Although the original aim of the project was to evaluate progress in learning language arts concepts through the use of movement techniques, this method has also been used by many of the participating teachers to teach math concepts. Therfore, improvement in MAT-Math Section scores will be evaluated in this group of students as well. A sample of the movement activities employed to teach math concepts in grades K-6 follows (7):

Concept: Many and Few

Hold up many fingers. Hold up just a few fingers. Can you touch many body parts to the floor? Touch just a few. Take many hops forward. Try a few hops backward. (Continue in this fashion with body parts and locomotor movement.)

Concept: Numbers

Can you make the shape of a number 4 with your body? hands? arms? legs? two arms and a leg? Can you make a big 4? small 4? low level 4? high level 4? tight 4? loose 4? Can you make a 4 with a partner? With three people? (Continue with other numbers.)

Concept: Numbers

Can you bounce the ball in the shape of a 2? Can you roll the ball with different body parts in the shape of a 3? Can you dribble the ball with your feet in the shape of an 8? Can you toss and catch the ball while you draw the number 6 with your feet on the floor?

Concept: Counting

Make the shape of a number with your rope. Now, walk along the rope and trace the number you made. Can you take just as many steps as the number names? (Continue with other numbers and locomotor movements.)

Concept: Sets

Everyone in the class think of an object you would like to describe through movement. You might be a machine, animal, building, etc. Now, I am going to describe a set such as "they eat food" and all the objects that fit into that set will make their shapes and move.

Concept: Computation

Find two friends to work with. Number 1 will

bounce the ball a number of times. Number 2 will add bounces and number 3 will bounce the sum. Rotate positions after each problem. (Multiplication problems may be done in a similar fashion. For subtraction and division problems number 2 must bounce a smaller number than number 1. Remainders may be shown with other actions such as punches or holding up fingers. Actions may be added instead of ball bounces.)

Concept: Mathematical Operations

Let's play "Who Am I?" I will ask a mathematical question (or write one on the board) and you show me the answer with a body shape. (Ask such questions as: Who am I if I am 2 more than 6? three less than 7? 4 tens and 3 tens? $\frac{1}{2}$ of 4 plus 2?)

Concept: Volume

Can half the class (or group) make the shape of a gallon container? Use any level you wish. Now fill the container with two quarts of people. Can you fill the container with two cups of people? (Continue with other size containers and measurements.)

Concept: Fractions

Can you make one-half of your body bend? Can you make the other half stretch? Can you make one-fourth of your body twist? Can you make three-fourths of your body shake? Can you gallop one-half the length of the room? Can you crawl two-thirds the length of the room? Can you walk backwards two-fourths the length of the room?

Concept: Geometric Shapes

With your rope make a geometric shape on the floor in front of you. Can you copy the shape with your body? Can you move the shape through space? Try another shape. Try some of your friends' shapes.

Concept: Geometric Shapes

Each group is going to make a shape obstacle course with their bodies for the other groups to move through. Try semi-circle bridges, triangles, medium level squares, circles at a low level, etc.

Preliminary data from the study group indicates several encouraging results thus far. Teachers report an increase in daily classroom test scores. They also note a general increase in motivation, independent thinking, self-concept and body control among their students. A change in peer groupings has been observed among students in the intermediate grades such that boys and girls are now working together with extraordinary cooperation.

The search for new methods of fostering intellectual development is a continuing stimulus for educational research. Coupling movement activities such as games to academic studies has proven to be one such method. The movement education approach outlined above is another promising technique which may provide benefits in the cognitive as well as the psychomotor and affective domains.

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Learning To Read Through Motor Activity

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In a sense this is an historic occasion for me because it was exactly 20 years ago in this same city at the AAHPER Research Section in 1958 that I presented my first research report on motor activity learning. In the intervening years six textbooks, two educational record albums and over 50 papers have been prepared on the subject.

Theoretically speaking, the hypothesis is that young children tend to learn better when there is a high level of physical response of the organism in the form of pleasurable physical activity. This approach should not be confused with the various programs involving perceptual-motor developmental training, a branch of physical education that I have arbitrarily identified as compensatory physical education. On the contrary, the approach may be more appropriately referred to as cognitive physical education in which children learn through the medium of physical activity. This motor activity learning approach has been very successful in the development of academic skills and concepts in most of the curriculum areas of the elementary school; however, the present report is confined to various facets of the phenomenon as it as it concerns Reading.

It seems appropriate at the outset to develop some working descriptions of terminology. A broad definition of reading is interpretation of written or printed verbal symbols. This can range from graffitti on restroom walls to the Harvard Classics. The reading act is a complex process. The entire child reads with his senses, his experiences, his cultural heritage, and with his muscles.

The term "motor" as far as human motion is concerned, pertains to a muscle, nerve, or center that effects or produces movement. That is, a nerve connecting with a muscle causes the impulse for motion known as "motor impulse." The term "activity" derives from the word "active," one meaning of which is the requirement of action. Thus, when the two words, motor and activity are used together it implies muscular action. Further, such muscular when it involves a change in body position is the description of the term "human movement."

Movement is one of the most fundamental characteristics of life and whatever else they may involve, most of man's achievements are based upon his ability to move. Obviously, the young child is not a highly intelligent being in the sense of abstract thinking, and he only gradually acquires the ability to deal with symbols and intellectualize his experiences in the course of his development. Since the child is a creature of movement and feeling, any effort to educate him must take this dominance of movement into account.

Motor activity will be conceived throughout this report as things children do actively in a pleasurable situation in order

to learn. Generally speaking, these activities include (1) active games, (2) rhythmic activities and (3) self-testing activities.

As far back as the late 17th century, Fenelon is reputed to have said, " I have seen certain children who have learned to read while playing." If one were the least bit given to rationalization, it could be speculated that this statement might well have been the first indication that there is a degree of compatibility between reading and motor activity, and a forerunner of some of the beliefs which I will expound in this paper.

In any event, in modern times the sensori-motor aspects of the real experience, the bringing of physical reality to the printed word and page present many outstanding opportunities for facilitating and enhancing perception and cognition. I fully recognize that the reading act ultimately emphasizes the representational nature of word symbols, and that the higher levels of cognition are abstract. Nevertheless, there is agreement that the physical reality of concrete experiences aids in comprehension. There is evidence that there is a need for increased emphasis upon the use of the physical reality of the child in his learning-to-read efforts.

The subsequent discussions in this report are concerned with examples utilizing motor activities that have been found effective in skill development and establishing interest and positive attitudes toward reading. These approaches are not only supported by respectable theoretical postulation but are backed up by sophisticated research as well. In the following discussion I will take into account the following: (1) diagnosis through motor activity, (2) use of motor activities for reading instruction, (3) motor oriented reading content, and (4) learning to read through creative movement.

DIAGNOSIS THROUGH MOTOR ACTIVITY

The comments made here on diagnosis through motor activity will focus primarily upon diagnostic teaching. Diagnostic teaching techniques employing analysis of children's performance in day-to-day reading situations has become a significant trend in assessment. Obtaining daily feedback is a key to structuring appropriate daily learning activities, because they are based on the "real" reading performance of the child. It is a better estimate of where the child is in his skill development.Therefore, in diagnostic teaching, teachers use such techniques as coding errors made by children while oral reading to prove points in the discussion of the material they are reading for a directed-reading-thinking activity. In this way the teacher has information about the children's sight vocabulary, word attack application to unfamiliar words in context reading, and comprehension skills. An aspect of maximum involvement of each child within a group activity is particularly inherent in motor activity. An example of this is an adaptation of the game, Steal the Bacon conducted as follows. This activity can be used to help diagnose reading readiness as it applies to auditory discrimination of beginning sounds of words. Two groups of about seven each stand about ten feet apart facing each other. An object (the bacon) is placed midway between the groups. The members of both groups are given letters b c d h m n and p or any beginning consonants. The teacher calls out a word such as ball, and the two children having the letter b

run out and grab the bacon. If desired, a scoring method can be devised for the activity. The teacher observes the reactions of the children and the activity can continue with the children being identified with different letters.

The uniqueness of motor activities as a means of classroom diagnosis is that such activities tend to remove the apprehension of testing procedures and can demonstrate a level of skill development that is possibly more consistent with day-to-day performance. Such performance of reading skill in a motor activity might even appear higher than when the children are engaged in a more traditional reading activity. This higher level of performance should be taken as a more accurate assessment of children's potential level of performance when they are operating under optimum conditions of learning.

USE OF MOTOR ACTIVITIES FOR READING INSTRUCTION

Motor activities in reading instruction can serve two basic purposes. Some activities can be particularly useful for developing specific language or reading concepts. In these activities the learner dramatizes or acts out the concept and thus is able to visualize as well as get the feel of the concept. Other activities help to develop skills through reinforcement of these skills in highly interesting and stimulating situations. Such activities can be utilized effectively to develop skills in the areas of sight vocabulary, word analysis skills, and comprehension.

In working with the motor activity approach to teaching reading skills, several guidelines can be useful to the teacher in order to provide meaningful and satisfying experiences for children. Often activities can be organized with the entire class participating. In such cases it is important that the less able reader not be penalized for his slowness or inability to perform a given task by being eliminated from the activity. Rules for the activity can employ procedures to incorporate a buddy system for giving responses or points earned for the individual or the team. Such procedures provide the slower learner the practice he needs by his remaining in the activity the rest of the children in their efforts to win.

In some activities such as active games, the children are divided into teams. In such situations it is considered as wise practice to arrange the selection method so that there is a balance of able readers as well as less able readers assigned to each team. This should also be considered when different physical skills are called for in a specific game. Such arranging by the teacher need not appear obvious and does help to provide a satisfying experience for all the children with a more even competition, thus accounting for individual differences of the children.

After an activity has been performed, it should be evaluated not only in terms of the children's reaction to it and how it was played, but also in terms of how well the children understand the concepts inherent in the activity, that is, what specific reading skill they were practicing.

The following illustration using the same activity is designed to reinforce a specific skill that has been previously introduced. The activity can be used to practice the phonics skill, auditory perception of long and short vowels. Members of both groups are given like vowels, some with a short sound and

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some with a long sound. The teacher calls out a word with a short vowel such as "fat" or "bit," or a word with a long vowel such as "fate" or "bite." The children react to the long or short vowel and the activity continues with the children exchanging vowel sounds periodically.

MOTOR ORIENTED READING CONTENT

One of the early attempts to prepare motor oriented reading content as conceived here is the work of one of my associates and myself. This original work involved a detailed study of reactions of six-to-eight-year-old children when independent reading material is oriented to motor activity. This experiment was initiated on the premise of relating reading content for children to their natural urge to play. Ten motor activities were written with a story setting that described how to conduct the activity. Thirty teachers in rural, suburban, and city school systems working with 54 reading groups of children used and evaluated the stories in active classroom situations. This carefully developed material--in terms of readability, the reading values, and literary merit of the stories--utilizes children's natural affinity for motor oriented play as the motivation for their reading. This unique reading content calls for active responses to the reading task, the task being one that involves learning to perform a motor activity. The following story is entitled Sparky Sparrow Plays a Game and should give a general idea of this type of reading content:

> The birds are asleep in their nests.
> Sparky Sparrow does not have a nest.
> He says, "I will have some fun."
> He calls, "Fly!"
> Each bird flies to another nest.
> Sparky finds a nest.
> One bird is left out.
> He calls, "Fly!"
> Again the birds find other nests.
> They have fun.

I am sure that many of you will recognize this as the age-old game of Squirrels in Trees.

Motor oriented reading content provides variety to the reading program. High interest and motivation are the results of purposeful reading and bringing words into physical reality by playing a game.

LEARNING TO READ THROUGH CREATIVE MOVEMENT (The AMAV Technique)

In collaboration with two members of the Reading Center at the University of Maryland I have developed a procedure for learning to read through creative movement which has been identified as the AMAV Technique. This technique involves a [illegible] sequence of auditory input to movement to auditory-visual [illegible] AMAV Technique is a procedure for working through cre[illegible]ement to develop comprehension, first in listening, and th[illegible]reading. The A M aspect of AMAV is a directed listening-thinking activity. Children first receive the thoughts and feelings expressed in a story through the auditory sense by listening to a recorded story. Following this they engage in movement experiences which

are inherent in the story and thereby demonstrate their understanding of, and reaction to the story. By engaging in the movement experience the development of comprehension becomes a part of the child's physical reality.

After the creative movement experience in the directed listening-thinking activity the children get into the final aspect of the AMAV Technique, that is, A——V, a combination of auditory and visual experience by listening to the story and reading along in a story booklet. In this manner, comprehension is brought to the reading experience.

Although the comprehension skills for listening and reading are the same, the sensory input is different. That is, listening is dependent upon the auditory sense and reading is dependent upon the visual sense. The sequence of listening to reading is a natural one. However, bridging the gap to the point of handling the verbal symbols required in reading poses various problems for many children. An outstanding feature of this technique is that the movement experience helps to serve as a bridge between listening and reading by providing direct purposeful experience for the child through creative movement after listening to a story.

Over the years I have attempted to build an objective base under this phenomenon. Several studies and observations permit us to make some generalized assumptions along with some reasonable speculations. Although the available data are not extensive enough to carve out a clear cut profile, they are suggestive enough to give rise to some interesting generalizations as follows:

1. The motor activity approach results in positive attitudes of children toward learning-to-read activities.
2. Children tend to learn certain reading-oriented language arts skills as word recognition, phonics, and structural analysis better through motor activity than through many of the traditional media.
3. Motor oriented reading content has been found to be successful in stimulating children's sustained interest in reading while at the same time developing and reinforcing reading skills.
4. This approach appears to be more favorable for children with average and below-average intelligence.

It will remain the responsibility of further research in these areas to provide more conclusive evidence to support these generalizations and speculations. There is reason, however, based on actual experience with this approach, to encourage those responsible for facilitating children learning to read to use this approach and to join in collecting evidence to verify the contribution of motor activity learning to the education curriculum.

NOTE: An outline, including a coded bibliography of all aspects of the "Humphrey Program of Child Learning Through Motor Activity" is available upon request from:

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Integrating Mathematics and Science Concepts in Physical Education

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In recent years there has been an increasing amount of research evidence showing the efficacy of integrating academic subjects with movement experiences for children. Rationale for teaching academic subjects in active learning situations include learning by doing; learning the abstract through concrete experiences, and learning because of increased motivation. Assuming that these and other reasons provide an acceptable rationale for attempting to integrate academic subjects with physical education, one must become inquisitive as to which academic concepts lend themselves to be taught in a movement environment.

The purpose of this paper is to identify mathematics and science concepts which can be taught in physical education. An examination of elementary school mathematics textbooks by Laidlaw, Ginn, Scott-Fousman, Rand McNally and others and recent mathematics research projects such as the School Mathematics, Study Group, Madison Project, Stanford Project, University of Illinois Arithmatic Project and Minnesota Mathematics and Science Teaching Project provided the author a means of assessing which mathematics concepts lend themselves to being taught in a movement environment. The reader is encouraged to confer with classroom teachers in their schools to discover which textbooks and which mathematics concepts are being taught to children at each grade level and then make an attempt to design lessons within the normal context of a physical education unit to enhance these concepts.

In general, during the primary grade levels (K-3) children learn about counting; categorizing objects into groups; seriating or putting objects into an order; adding; subtracting; basic set theory including universal and null sets, finite sets, and basic set operations; geometry; the metric system; mathematical sentences, measuring; fractions; word problems; and some of the field properties of mathematics such as identity and the commutative and associative properties for addition. During the intermediate grades (4-6) children learn about sets; set operations including the union and intersection of sets; the field properties of mathematics such as the commutative and associative properties for multiplication and the distributive property for multiplication and division; geometry including angles and concave and convex figures; measuring and graphing; mathematical sentences; fractions; decimals; and the metric system. With the passing of the December 1975 law requiring the United States to convert to the metric system, physical educators should use every opportunity to measure metrically those events which lend themselves to recording length or distance, weight and volume to help children to use the system efficiently.

Because of the technological age and culture in which we live children in the elementary schools must also be exposed to

a variety of meaningful science experiences which lead them to an understanding of the world about them. After reviewing similar textbook series as those mentioned above and examining science research projects such as the Science Curriculum Improvement Study, Science Concept Development in the Elementary School, and American Association for the Advancement of Science, one discovers that science concepts can be divided into the biological, physical and earth sciences. Current emphasis in each of these science areas include activities which help children learn to classify objects; quantify and qualify objects; observe; compare objects; group; rank information in order of importance; measure; recognize space/time relationships; convergent and divergent thinking; investigate; invent; and plan and carry out experiment. Of the three classifications of scientific endeavor, those concepts which are taught in the physical sciences are most applicable to movement experiences in physicaleducation. During the elementary years children are exposed to concepts involving machines including the three types of levers, Newton's laws of motion; types of motion; factors affecting motion; work; friction; resistance; gravity; centrifugal force; force; energy; inertia; momentum; sound; and buoyancy. In the biological and earth sciences children can be exposed to simple physiological concepts of the body; zoological concepts regarding animals; botanical concepts regarding plants; geological and geographical concepts regarding the environment; and astrological concepts regarding the earth and other planets through lessons designed to enhance the cognitive through movement experiences.

In the final analysis of studying the possibilities of integrating mathematics and science or any subject for that matter with physical education, one must reflect on its purpose. Its purpose is not to justify physical education as an academic discipline. Its purpose is to enhance the cognitive, affective and psychomotor domains of childhood education by becoming a significant segment to the total elementary school curriculum. By designing movement experiences in a conceptually based curriculum which enhance the learning of academic subjects, thereby using the so called "teachable moments," the intent is to make learning msot meaningful for the child. For that reason it is justifiable.

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Play Environment Assessment Instrument: Early Experience and Enhancement Factors for Development of Motor Patterns

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Play can be thought to include both free and direct patterns of play. As adults we are interested in the construction of play environments that assist the child in the use of play areas on a cognitive, social, emotional, and physical level. In other words, the goal is to construct an environment to keep children involved in continuous and ongoing play patterns while increasing interaction time, problem solving, selection of individually appropriate tasks and, the time spent and type of motor patterns selected. Free play patterns can become like those we desire for the child, and thus assist development, if care is taken in the design, construction and ultimate evaluation of play structures.

A series of 15 assessment forms is being developed to include the full range of concepts usually thought to be a part of good play structure design (Dattner, 1969). These include (1) maintenance, (2) play leaders, (3) adult distance, (4) toilet facilities, (5) safety, (6) sand area, (7) motor area, (8) social groupings, (9) equipment design, (10) existing equipment classification, (11) graduated challenge, (12) building materials, (13) sensory provisions, (14) community involvement, and (15) hourly use rate.

Items selected for inclusion on each form have been generated from current literature available on play environments. Examples of the forms as they appear as a part of the Play Environment Assessment Instrument (PLEN) appear below:

Form 8: Social Groupings	Score
1. Provision for interaction in 5-10 children group areas.	1 pt.
2. Provision for interaction in smaller confined groups--2-3 children confined group areas.	1 pt.
3. Provision for solitary play areas.	1 pt.
4. Provision for play areas where players can fully see observers but where observers cannot fully see players.	1 pt.
5. Provision for areas where adult observer can only enter with difficulty.	1 pt.
6. Provision for at least 3 different gathering areas at different heights.	3 pt.
7. Optional (evaluator rates highly provision not recorded above).	1 pt.
Description: _____	
TOTAL:	
9 possible pts.	

Form 9: Equipment Design

	Score
1. Provision for equipment response to a child's movement affecting other players. Description:	1 pt.
2. Provision for at least 4 different climbing surfaces. Description: a. b. c. d.	2 pts.
3. Provision for non-descript equipment on which fantasy or role playing can be actively engaged in. Description:	1 pt.
4. Provision for at least 4 areas where changes in play decisions can be made so that the child does not risk losing face. Description: a. b. c. d.	2 pts.
5. Provision, for at least 3 different height changes in equipment.	1 pt.
6. Provision for potential high activity areas placed evenly throughout the play environment.	1 pt.
7. Optional (evaluator rates highly a provision not recorded above). Description:	1 pt.
TOTAL: 9 possible pts.	

A new concept introduced for use in assessing play environments includes an Hourly Use Rate or HUR value. This is used to obtain an overall assessment of the play environment's attractiveness based on the number of children currently using the play structure, during a randomly selected period, and the projected number of children the play environment was designed to accomodate.

Form 15: Hourly Use Rate (HUR) — Score

Part A: For two, one hour observational periods, one of which falls on the weekend, record the number of players who enter and commence playing in or on the play environment. Average to determine a HUR score.

HUR: ____

Part B: Determine the design player capacity for the play area through local controllers. Use this capacity against which to evaluate the HUR.

1. HUR equivalent to 80% capacity.	(8 pts.)	____
2. HUR equivalent to 60% capacity.	(6 pts.)	____
3. HUR equivalent to 40% capacity.	(4 pts.)	____
4. HUR equivalent to 20% capacity.	(2 pts.)	____
5. HUR equivalent to 10% capacity.	(1 pt.)	____
TOTAL: 8 possible pts.		____

The total number of points from each of the fifteen forms is then totaled on a report form to provide an overall PLEN score. Of a possible 125 points, an evaluated play environment would receive a score that allows it to be compared with other play areas.

Report Form		Points
Form 1:	Maintenance	_____
Form 2:	Play Leaders	_____
Form 3:	Adult Distance	_____
Form 4:	Toilet Facilities	_____
Form 5:	Safety	_____
Form 6:	Sand Area	_____
Form 7:	Water Area	_____
Form 8:	Social Groupings	_____
Form 9:	Equipment Design	_____
Form 10:	Existing Equipment	_____
Form 11:	Graduated Challenge	_____
Form 12:	Building Materials	_____
Form 13:	Sensory Provision	_____
Form 14:	Community Involvement	_____
Form 15:	Hourly Use Rate	_____
	TOTAL PLEN:	_____
	125 possible pts.	

Based on the merit of its design and construction each play structure could then be assessed in accord with some established standard.

Plans to collect and compile PLEN scores and thus establish normative data are scheduled for summer 1978 through summer 1979.

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The Effect of Changing Structural Complexity on the Observed Motor Behavior of Preschool-Age Children

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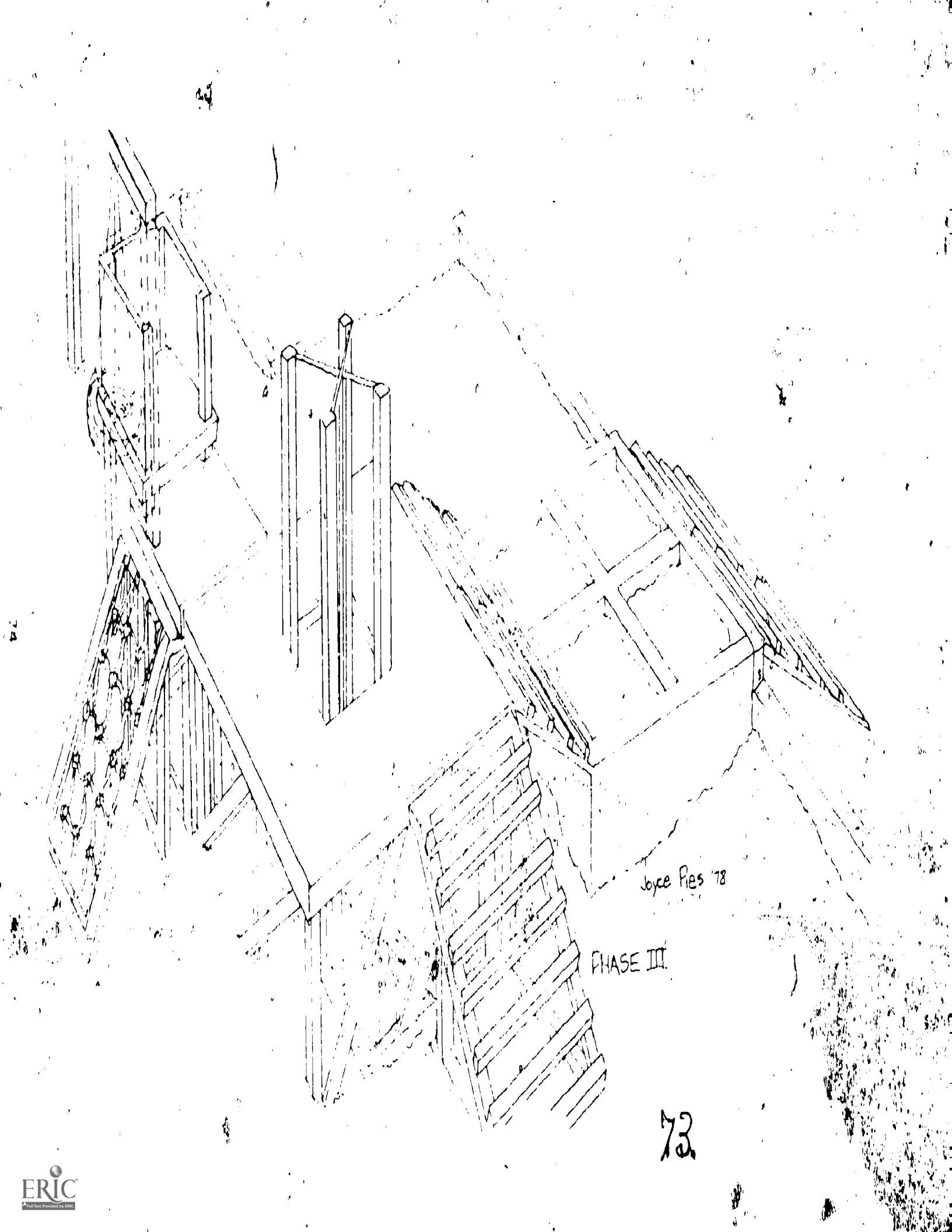
Introduction. This presentation involves a unique and innovative on-going research project. The research is supported through a Faculty Research Grant at North Texas State University (#35718); funded for $10,000; September 1977-August 1978.

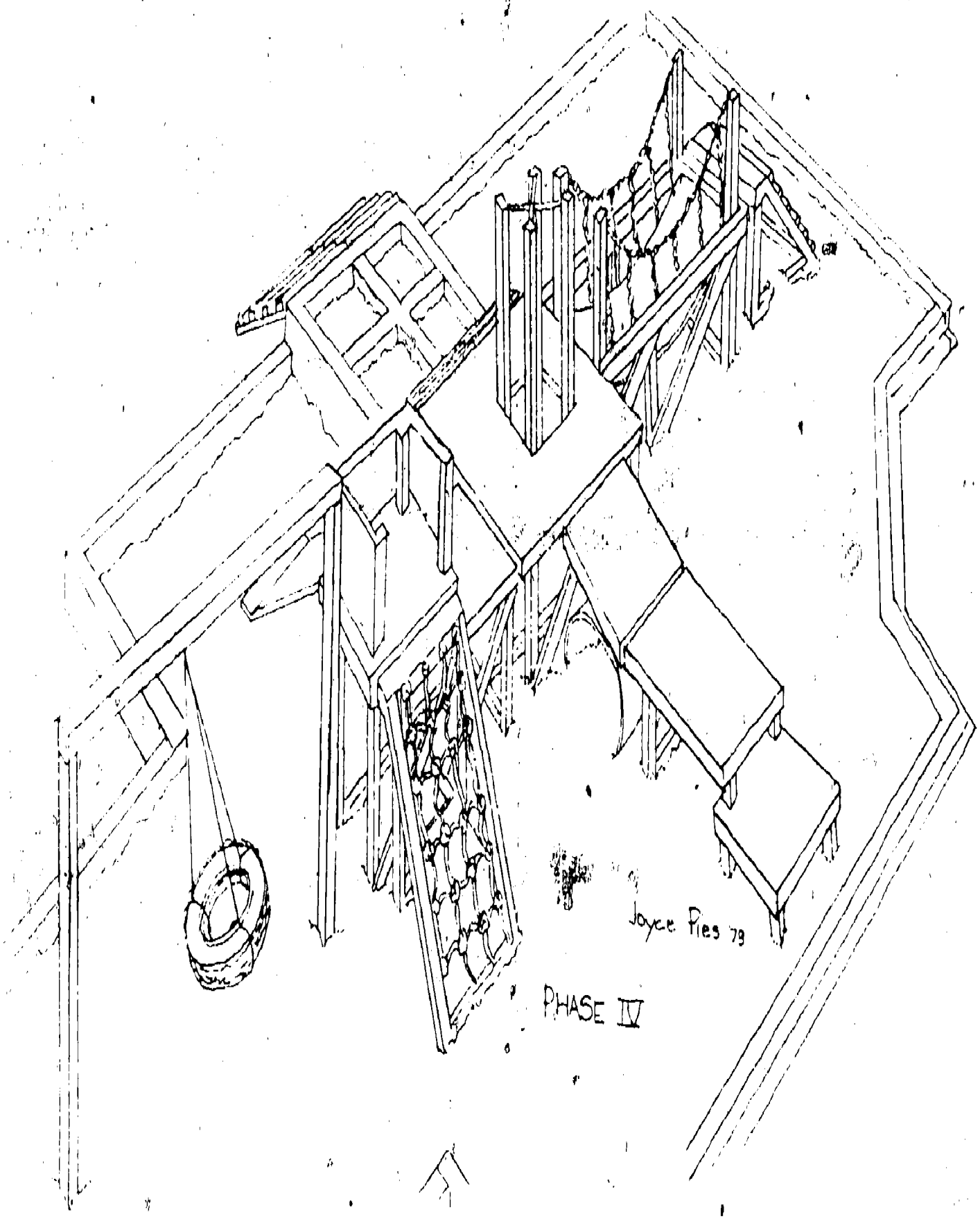
Purpose. The purpose of the study is to determine if variations in designed play environments for children will effect changes in motor behavior. The research data should aid in the determination of a design capability for meeting selected motor needs of preschool-age children.

Methodology. Using complexity as an independent variable and as an indicator of arousal-seeking behavior (Ellis, 1973), a play environment is being developed on a variable complexity basis (Variable Complexity Play Environment--VCPE). The construction of a modularized VCPE will permit varying of the play environment so that each change results in a more complex environment. Four phases which reflect variations in complexity and use of new and old play concepts will be employed. After each variation, the same subjects will be allowed to play on the newly organized VCPE while motor behaviors (percent of time spent and distance traveled) for each child are recorded. Percentage of time spent in each motor behavior will be recorded using a system similar to the one used by Bowers in 1975. The sample will include all of the children attending the North Texas State University nursery school (ages 3, 4, and 5). Sex will not be considered as a factor for the purposes of this study. Data collection utilizes a repeated measures design. Data will be subjected to analysis of covariance and to correlational analysis.

Expected Outcomes. Pilot studies and research projects at Florida State University (Bowers, 1975) and at the University of Wisconsin have determined that the complexity dimension is an important variable for keeping children actively involved in play. This is in accord with play arousal theory reported in the literature (Ellis, 1973). Complexity in a play environment was found to elicit a child's attention in direct proportion to its degree of complexity (Burke, 1977). It is evident that this variable, if isolated for study, should yield information concerning the changing patterns of children's play and its use as a design component for play environments. Due to the only recent emphasis on this vein of research, the literature provides amazingly little understanding concerning the use of complexity as a variable when analyzing the type of play behaviors children become involved in during play. Bowers (1975) reported that children participate in at least 32 different motor patterns or play behaviors during free play. The findings in this study should contribute significantly to a greater understanding of the complexity variable in play and therein further the capability to design play environments for children that will effect changes in motor behavior.


Joyce Pies '78
PHASE II


Joyce Pies '78
PHASE III



PHASE IV

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Children and Their Play Behavior

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Objective of the Presentation The Interactive, Arousal-Seeking Theory as synthesized by Michael J. Ellis is presented to facilitate the recognition of relationships between modern play theory, the play behaviors of children, and the environmental design for playscapes.

Historical Overview Historically, play theory has developed as a result of both "Objective Scientific Endeavor" and "Subjective Non-Scientific Endeavor." In general, researchers have established three categories for play theory. They are: "Classical Theories", "Recent Theories", and "Modern or Contemporary Theory."

Classical Theories A number of theories are typically grouped in this category. Some of the most commonly found are: Surplus Energy I, Surplus Energy II, the Instinct theory, the Preparation theory, the Recapitulation theory, and the Relaxation theory. Of the six suggested theories within this category, only two, Surplus Energy II and Preparation, possess values to retain for serious consideration. Surplus Energy II theory suggests that play is caused by increased tendency to respond after a period of response deprivation. The Preparation theory suggests that play is caused by the efforts of the player to prepare for later life.

Recent Theories Numerous theories are also found in this category. Among the many are the following: the Generalization theory, the Compensation theory, the Catharsis theory, the Psychoanalytic theories, the Developmentalism theory, and the learning theory. Of the seven suggested theories within this category, only two, Developmentalism and Learning, possess any values to retain for later consideration. The Developmentalism theory suggests that play is caused by the growth of the child's intellect and is conditioned by it. Play is seen to occur when the child can impose on reality his own conceptions and constraints. Perhaps the best known thinker associated with this theory is Piaget who is concerned with the cause of play, but more importantly with its content. Basic to Piaget's concepts are the theories on motivation and learning. The Learning theory suggests that play is caused by the normal processes that produce learning. Cultural, sub-cultural, and familial differences support the view that quantity and content of play behavior is learned. This theory can account for the

content of an individual's play if not his inherited tendencies to play.

Modern and/or Contemporary Theory. Modern theory has resulted from the scientific, objective analysis and synthesis of previous play theory as already presented, in part, plus extensive research. Michael J. Ellis is, perhaps, our best play theorist. Ellis suggests that the most accurate theoretical basis for explaining play is his Interactive, Arousal-Seeking Model. The Ellis model theorizes that play is caused by the need to generate interactions with the environment or self that elevates arousal (defined as level of [illegible] stimulation) towards the optimal for the individual.

Ellis' model assumes four factors: 1) that stimuli vary in their capacity to arouse, 2) that there is a need for optimal arousal, 3) that change in arousal towards optimal is pleasant, 4) that the [illegible] learns the [illegible] that results in that feeling and vice-versa.

The Interactive, Arousal-Seeking theory is very general and handles well questions of both work and play. Ellis actually questions the validity of separating work from play. Together with Learning and Developmentalism, this theoretical package represents a very powerful theoretical base for professionals concerned with play. When also coupled with the Competence and Effectance theories (they [illegible] within the Ellis model) and especially with Learning and Developmentalism, the Interactive, Arousal-Seeking Model appears to be our [illegible].

Ellis' Arousal-Seeking [illegible] explains the mechanism [illegible] individual [illegible] with the [illegible] the needs of immediate [illegible] behavior [illegible], via [illegible] the content of the behavior [illegible]. The [illegible] effect of such learning [illegible] with the arousal-seeking motive to produce [illegible] complexity of the interaction [illegible] in the developmental path [illegible] continuous process of [illegible] general stages where growing [illegible] through similar phases [illegible].

Practical Implications. Children play for the [illegible]. Stimulation must contain [illegible] characterized by "novelty," "[illegible]," "[illegible]," and "complexity." [illegible] knowledge [illegible] with the play environment.

The [illegible] of structuring play and play environments [illegible] "Optimal Arousal" within

a "Dynamic Environment." Such a process results from a skillful blend of the objective knowledges of science (known as theory and principles) with subjective knowledges of practitioners.

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Play Environments in Texas Pre-primary and Primary Public Schools

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The need for effectively designed outdoor learning environments for preprimary and primary children is recognized by classroom teachers and physical educators alike. Such an environment provides much more than space for unihibited physical movement. It stimulates youngsters to learn to use and control their bodies and emotions as they develop intellectual competency. An extensive survey of Texas preprimary and primary public schools revealed that existing playgrounds differed drastically from the desirable learning environment described above. Although the school districts included in the study varied from an enrollment of 21 to 34,337, the description of playgrounds for young children were consistently dismal.

Despite teachers and parents reported interest in planning and preparing outdoor learning sites, less than one-half of these 269 preprimary and primary schools involved teachers and less than one-third involved parents in such projects. The need for a concerted effort by the school and the community to improve preprimary and primary outdoor learning environments is reflected in the information gathered in this study conducted in 1976. Portions of that information are reviewed in the following paragraphs.

Slightly more than 50 percent of the schools had playgrounds of 3,000 to 3,500 square feet size; however, the space was reported to be improved by a specific design for learning by only one school. The remaining schools tended to arrange traditional equipment in a line at the edge of the playground. In Texas, there is no state money available to assist schools in acquiring outdoor equipment. Schools used local funds in 58 percent of the cases while 27 percent relied on Parent Teacher Association gifts to furnish outdoor equipment and materials. For many, the source of funds was irrelevant since 63 percent of the schools reported no plans for additions to or modification of existing equipment and facilities.

The playground sites afforded a variety of surfaces with 88 percent reporting grassy surfaces, 60 percent reporting some asphalt surface, and 57 percent reporting portions of the playground as barren. Although temperatures in Texas are so extreme that protection from sun and inclement weather is needed for year round use of the outdoor area, only 14 percent of the sites provided covered areas. Approximately two-thirds of the schools had trees and shrubs; however, sketches made by principals showed them as primarily decorative rather than utilized for the children's play space. Although children's safety was cited as a major concern of both principals and teachers, 60 percent of the playgrounds were not fenced. Of the 40 percent with fenced outdoor space, several noted that only one side of the space was fenced while the remaining sides were open.

Equipment on these playgrounds was sparse with little or no accomodation for creative, dramatic or construction play. The eight most popular equipment items are listed below in descending order of preference.

Monkey Bars	87%
Slides	61% (25% are 10 to 15 feet high)
Swings	[illegible]%
See-Saws	44%
Merry-go-round	40%
Sand box	22%
Wheel Toys	20%
Playhouse	10%

Monkey bars were involved in 40 percent of the accidents requiring a physician's care and/or hospitalization. Nonetheless, this item was enormously popular and in some schools it was the only item provided on the play site.

Many teachers commented that wheel toys were the basis for considerable conflict among children. This may be the effect of providing only one or two wheel toys for an entire school. The scarcity of these toys is illustrated particularly in one region of the state which reported four tricycles for 544 preprimary classrooms.

The survey sought to determine the outdoor curriculum approaches used with preprimary and primary pupils. No outdoor learning period was scheduled for 35 percent of the children grade 3 and below. The type of classroom organization (self-contained or open concept) appeared to have no effect on or relation to the outdoor curriculum. None of the 65 percent of the schools which provided outdoor learning periods reported an integration of indoor and outdoor curriculum or a planned program of instruction for the outdoor learning period. Free play physical activities accounted for a major portion of children's outdoor play time.

The importance of outdoor learning in developing concepts, motor skills, sensory-motor skills and social-interpersonal skills was rated by principals and teachers. Principals assigned a greater importance to social-interpersonal and motor skills than did teachers. Principals' comments indicated that behavior contributing to conformity to school routine was considered the nucleus of social interpersonal skills development. Taking turns, staying in line, observing rules and regulations and respect for authority were noted as valuable social skills learned on "good playgrounds."

Principals and teachers suggestions for modification of existing curriculum for outdoor learning experiences of young children emphasized organized teacher directed activities with the competitive sports of football, baseball, and soccer taking precedence over all other suggestions. The addition of physical education teachers to elementary staffs was recommended by 42 percent of the respondents. The desire to place children's outdoor learning entirely into the hands of physical education teachers was expressed by 56 percent of those surveyed.

In summary, the existing conditions for preprimary and primary outdoor learning experiments were found unfavorable for the intellectual, social and motor development of Texas' young children. Equipment was designed and used primarily for functional exercise with little or no provision made for the dramatic and construction play of youngsters. These limiting physical features were enhanced by common misunderstanding of the nature and function of children's play among teachers and principals.

Historical Perspectives of Play Environments

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Although play is as old as history itself, provision of space for children to play is a relatively recent development. A painting by Pieter Breughal the Elder in 1560 depicts children engaged in eighty-five different street games. Children had always played in the streets, creeks and hay lofts until the industrial revolution, when urban society became too complex and dangerous for children to roam at will. In the 1870s the city of New York built one of the first playgrounds in this country in Central Park. Its main feature was a wooden swing set where elegantly dressed children were taken to "let off steam." During the next one hundred years playgrounds evolved into barren metal and asphalt compounds often more dangerous than the outside world, while all other aspects of early childhood education changed dramatically for the better. Only in the past two decades have playgrounds begun to change.

The theoretical basis for better playgrounds was established earlier. Rousseau (8) believed the needs and activities of the young child should be substituted for a formal curriculum. He rejected indirect learning from books and others and insisted instead upon direct observation of concrete objects. "The lessons the scholars learn from one another in the playground are worth a hundredfold more than what they learn in a classroom." (8, p. 89) Froebel (5) considered play to be the highest phase of child development. In play the child strengthens the mind and body through his inner directed activities. Froebel's philosophy became part of American education through the establishment of Froebelian kindergartens in the latter half of the nineteenth century.

Early in this century Maria Montessori (7) wrote: "It is high time that movement came to be regarded from a new point of view in educational theory. . . . As a part of school life, which gives priority to the intellect, the role of movement has always been sadly neglected. When accepted there at all, it has only been under the heading of 'exercise,' 'physical education' or 'games'. But this is to overlook its close connection with the developing mind." (7, p. 136) She believed the outdoor environment to be as important as the indoor.

For more than thirty-five years Jean Piaget and his colleagues at the Rousseau Institute in Geneva have been studying the development of intellectual functions in children. According to Piaget, actions

by the child constitute the raw material of all perceptual and intellectual development. Second, the concept of intelligence as action provides the connecting bridge between successive developmental stages.

Educators now generally agree that perceptual/motor skills are necessary to learning. Perception can be defined as the environment acting on the child. Motor activity is the child acting on the environment. While the importance of active play was being established in theory and being put to practice in indoor motor development programs, the idea of a planned outdoor playground with structures to promote total child development has been virtually unexplored until very recently.

A direction for future playgrounds was charted as early as 1971 when Danish landscape architect C. Th. Sørensen observed children playing around construction sites, but it was not until 1943 that the first child-built play area was established in a housing project in Copenhagen. Early photographs show children playing in old cars, sewer pipes and shacks that would appear to most adults as a hopeless mess. The concept attracted world wide attention. After the war Lady Allen of Hurtwood visited Denmark, began establishing adventure playgrounds in low income areas of London, and published, in 1968, the book Planning for Play (2). Her youth center-playgrounds have been widely admired and copied (mostly in Europe) with mixed results.

An outraged cry for better playgrounds was sounded in this country in 1969 by David Aaron in his book Child's Play (1). Mr. Aaron suggested that all traditional equipment be removed and replaced by abstract, non-moving structures where children create their own play. The country didn't rush to his suggestions, and in a way that is a good thing, for his designs have a rather sterile look by today's standards. But his indictment of the old playground made a strong case for change.

In the short time since adults discovered what children had known all along--that the standard playground is a bore--a rift has developed among those who unanimously agree that the old model must go. The disagreement between designers of architectural playgrounds and the proponents of the child-designed adventure playgrounds is more than just a difference between American and European values. The problem is partly semantic. The word "playground" is being used for two very different facilities which meet diverse needs. The architectural playground is meant for a public place such as a park, open schoolyard or housing development. It is typically built with a large capital expense and is designed for permanence and low maintenance. The adventure playground is meant for a secure enclosed space and has been used primarily as part of a community or day care center. While it is

constructed by children and adult supervisors out of scrap material, its primary cost is the ongoing expense of constant supervision. Rarely have city governments or school districts in the United States been willing to experiment with a playground whose physical appearance is repellant to most adults and whose cost of operation (including insurance) is unknown and continuous.

By the 1960s new playgrounds were being built in various parts of the country, often designed by leading architects and landscape architects. They run the gamut from thoughtfully planned play environments to junk heaps built of waste materials by well-meaning non-professionals to outrageously expensive architectural monuments. Manufacturers began to vastly expand their product lines. Three excellent books were published in the late '60s and early '70s by designers Paul Friedberg (4), Richard Dattner (3) and Jay Beckwith (6) which deal with play theory, document their own work, and call for more research and development in the field of play design.

Child's play is finally being taken seriously by adults. Empirical research has begun. But by and large most school grounds still look distressingly bare compared to classrooms filled with learning materials of every description. The next challenge in the field of education may be the recognition of the playyard as an exciting outdoor classroom. It is a new and admittedly experimental field; we are only beginning to ask the right questions.

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New Concepts in Play Environments

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Until recently playgrounds were "designed" by manufacturers who produced five basic structures (swings, slides, jungle-gyms, merry-go-rounds and see-saws) and by the buyers who arranged the pieces to fit available space. Consumers can now choose from hundreds of new manufactured products. Community groups are also making play equipment from scrap materials. In either case, the emphasis is usually on separate play structures, each designed to perform one specific function, not unlike the traditional playground pieces. Even well designed equipment that provides for several kinds of play activity is less effective in isolation than it would be when intelligently planned as part of a total environment.

Planning for play is a process of blending site and structures together into a space that meets the needs of both children and adults. Out of observable needs, criteria can be established to serve as guidelines for a common-sense approach to play design.

Criteria for Contemporary Play Design

Play Value:

From a child's viewpoint, the place where he plays should be exciting and challenging. It should allow him to set his own limits, give him choices, and let him make decisions. It should transport him into his own imaginative world, and offer ways he can constructively alter that environment. Play should flow in a continuous pattern where the child is naturally led to explore a variety of ways to test his skills--balancing, climbing, jumping, crawling, running and hopping. It should not force him to wait in line to play.

Safety:

From where adults sit (hopefully on a comfortable bench), the playground must be designed for safety so that they can relax in the knowledge that children don't need constant supervision. Falls cannot absolutely be prevented, but with safe surfaces--sand, pea gravel, tan bark, rubber matting, to name a few--serious injuries can be virtually eliminated. The structures themselves should be designed correctly, with hand-holds and guard rails where needed. And the equipment must be scaled to the size of the children using it. A third and more important safety factor is the elimination of pressure points (such as a high and

narrow slide that requires turn taking). Structures should have a variety of ways on and off so that several children can play together and small children can find a comfortable way down.

Child Development:

Educators, especially in early childhood and physical education, are recommending that the playground function as an outdoor classroom. Equipment should be designed for a full range of physical movement, including activities that sharpen coordination and promote muscular development and sensory perception. The play environment should encourage cooperative play, but also be able to support parallel or individual play.

Aesthetics:

The general public can legitimately require that playgrounds complement the natural terrain in which they are placed. A playground is ideally a large outdoor sculpture formed as a collage of shapes, forms, colors, and textures which blend into a visual whole. It must be easily maintainable as well.

The designer, in attempting to meet this assemblage of conflicting needs, must ask questions before the design process begins. Where will the playground be located? Will there be supervision? What age children will be using the space? How many at the same time? What kinds of play possibilities need to be encouraged? What site features (trees, slope, etc.) can be incorporated into the play structures? How many structures or how large a space will the budget allow? Can any existing structures be recycles into the new play area?

Beyond this site analysis, the most important questions involve the movement of children through the designated space. What structures can be bought or designed to incorporate the widest variety of motor skill activities? How many ways can be devised to get on and off a structure? How can the structures be linked together to suggest play patterns? The design then begins to become a whole greater than the sum of its parts.

Finally, dreary, mundane questions must be asked. What will it cost? How can the space be maintained easily and economically?

Design ideas do not arise magically out of the imagination of the designer, but grow directly through study of the individual situation and communication among the people involved in the project. Designing aesthetically appealing structures is easy, and children don't care how the place looks anyway. Planning functional play areas requires knowledge of child development, kinesthetics, psychology and several related fields. A too-safe playground may

not be much fun and go unused. And just because it is fun doesn't make it safe or constructive or attractive. A playground designed only for body development would probably be boring. Common sense and observation of children remain the best guides.

The first step in the actual design process is diagramming traffic flow through the space in terms of linked structures and pathways. Areas need to be defined by retaining walls which not only contain the impact-absorbing ground surface (usually sand or gravel about 9" deep) but also serve as play paths. The structures themselves should have a variety of ways to get off, on, over, under and through. Good manufactured equipment can be used for the main structures, or simple platforms or treehouses can be built that will serve as "places to go." Getting from place to place becomes the primary challenge when pathways are suggested with stepping stones, balance beams, tunnels, overhead ladders, cargo nets or even trike trails.

When the playground is planned on paper, the next step should be to build a scale model which provides an exact picture of the three-dimensional space and allows for design modification. The model is an invaluable aid to the eventual construction crew and can be used as a fund-raising device if the project is to be built in stages.

The ideal play environment doesn't exist. And if there were one it would be an ideal solution only for that particular site and those children and adults for whom it was planned. Our ideas about play undoubtedly will expand as new research adds to our knowledge of how and why children play. And certainly new materials will be developed. It is quite probable that the best contemporary play environments will look antiquated a hundred years from now. But our society should provide the best play spaces possible for today's children.